STATE OF CALIFORNIA
DEPARTMENT OF NATURAL RESOURCES

Economic Mineral Resources and Production of California

A Survey With Reference to Postwar Employment

BULLETIN 130

A Report to the
State Reconstruction and Reemployment Commission
under Chap. 35, Stat. 1944, Fourth Extra Session

DIVISION OF MINES

FERRY BUILDING, SAN FRANCISCO

STATE OF CALIFORNIA
DEPARTMENT OF NATURAL RESOURCES
WARREN T. HANNUM, DIRECTOR

DIVISION OF MINES
FERRY BUILDING, SAN FRANCISCO

WALTER W. BRADLEY — State Mineralogist

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BY
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39750

printed in CALIFORNIA STATE PRINTING OFFICE
SACRAMENTO, *1945* GEORGE H. MOORE, STATE PRINTER

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LETTER OF TRANSMITTAL

To His Excellency, THE HONORABLE EARL WARREN
Governor of the State of California

SIR: I have the honor to transmit herewith Bulletin No. 130, of the Division of Mines on the subject of "Economic Mineral Resources and Production in California; A Survey with Reference to Postwar Employment," by Samuel H. Dolbear, consulting mining engineer, and contributing authors.

This report is made pursuant to a contract entered into between the State Reconstruction and Reemployment Commission and the Division of Mines of the Department of Natural Resources, provided for in Chapter 35, Stat. 1944, Fourth Extra Session, which appropriated the sum of $20,000 for such a survey.

Time being an important consideration in order to have the report available to members of the Legislature at its forthcoming session, it was deemed advisable to contract the major responsibility for the survey to an outstanding, experienced, consulting mining engineer assisted by the regular engineering staff of the Division of Mines and such other specialists as he would associate with himself.

STATE RECONSTRUCTION AND REEMPLOYMENT COMMISSION
BY ALEXANDER R. HERON, *Director*

San Francisco, January 6, 1945

PREFACE

Unprecedented amounts of mineral products are being drawn from the earth to provide the materials of war. Inasmuch as production in peace and in war reduces the volume of raw materials available for the future, both for peacetime pursuits and for future wars, it is necessary to appraise the future in the light of evidence of possible approaching exhaustion. Mineral reserves can, in effect, be replaced, but this is possible only so long as new discoveries are made or when new technique or economy makes possible the utilization of material now known but not economically available.

In this report we are concerned with these matters as they may affect postwar employment. Appraisal of possible production, and therefore employment, is not as simple as the mere availability of mineral reserves. Minerals are used for innumerable purposes in almost every branch of human endeavor, and operation depends, therefore, on the ability of others to absorb the production of mines and quarries.

California is fortunate in possessing a wider variety of minerals than possibly any other similar area on earth. In 1943 the production of over 60 different mineral substances was reported, creating a complex and highly diversified industrial group. Each of these has been separately studied in an attempt to learn what part it may play in the postwar economy.

The metal mines and petroleum resources of the State have been utilized in a substantial degree in the past, but the non-metallic materials, while comprising an important part of the mineral industry, have not been adequately exploited. Herein lies an opportunity for industrial expansion of major importance. A carefully developed and coordinated plan to utilize many of these minerals as well as some metallic ores as the basis for an expanded chemical industry has been suggested in this report. Only by a full utilization of these resources can the mineral industry find its share of employment for a greatly expanded population.

To this complex of a large number of mineral problems must be added the elements of a changing social viewpoint, the increasing tendency of government to exercise control over, or participate in, industry, and the growth of labor's voice in management.

This report is, of course, written under the assumption that "free enterprise" will continue to function after the war with at least the same degree of freedom from restraints that has existed in the past. Social change, regardless of its possible ultimate wisdom, not only may profoundly affect the economics of production but so long as its result is unknown is a contributing factor to "risk."

The time available for an exhaustive study of all of these problems has been too limited for a comprehensive exposition of all factors involved, or for a thorough check of all of the information upon which it has been necessary to rely. If errors of statement or conclusion are found in this work, these circumstances must be charged in part for their presence.

Petroleum, which usually accounts for 60 percent or more of the total annual value of mineral output, is not treated in detail in this report, as it is subject to a separate investigation by the State Reconstruction and Reemployment Commission.

If this work shall serve to stimulate increased activity in the mineral industry and with it increased employment in postwar times, it will have served a high purpose.

SAMUEL H. DOLBEAR

San Francisco, California
January 5, 1945

ACKNOWLEDGMENT

To the large number of officials of mineral producing concerns, too extensive for individual mention, acknowledgment is made for their helpful suggestions and contribution of essential data.

Mr. Walter W. Bradley, State Mineralogist and his staff of engineers comprising Messrs. C. V. Averill, F. Davis, O. P. Jenkins, J. M. Little, C. A. Logan, J. C. O'Brien, H. H. Symons, R. J. Sampson, and W. B. Tucker, have cooperated freely in providing basic information of the California mineral industry and in making suggestions as to increasing the usefulness of the Division of Mines in expanding the mineral industries.

I am particularly indebted to Dr. R. R. Sayers, Director of the U. S. Bureau of Mines, for his cooperation in reviewing certain manuscripts and for procuring the release of statistical data heretofore withheld by censorship requirements.

Engineers who have rendered assistance in constructively reviewing parts of the report and have forwarded much useful data include Messrs. F. Cecil Baker, George A. Connell, Gordon Gould, Mack C. Lake, Charles White Merrill, W. W. Mein, Jr., Harvey S. Mudd, Max Y. Seaton, and J. R. Van Fleet.

Mr. M. I. Gershenson and staff of the State Division of Labor Statistics and Law Enforcement, has been particularly helpful in aiding in the study of employment.

SAMUEL H. DOLBEAR

SUMMARY

Mineral production in California was first comprehensively recorded in 1887. At the close of 1943 the mineral deposits of the State had yielded $11,189,489,653.

The wide distribution of mineral resources is evidenced by the fact that each of the State's 58 counties has contributed to this production and in only two has the value been less than one million dollars. Los Angeles County has been the leader, with output in excess of 2 billion 800 million dollars, followed by Kern County with over one billion 900 million dollars. Orange County with over 800 million dollars and Fresno County exceeding 500 million dollars, occupy third and fourth rank respectively. Ventura has fifth position with a record of 466 million dollars.

Over 60 percent of California mineral production in recent years has been petroleum and natural gas. The value of all mineral production in 1943 was $429,033,190 of which petroleum and natural gas was $317,370,135 or about 74 percent.

The value of manufactures processed in California from mineral raw materials including petroleum amounts to several billion dollars per year.

Notwithstanding the closing of gold mines by government edict, resulting in a loss of output of about 45 million dollars per year, the value in 1943 of all mineral production was 2 percent higher than that of 1942.

Over 60 different minerals are produced in the State; a wider variety than any similar area in the world.

Employment in mining and quarry operations and related processing in 1940 was 32,628. Postwar expectancy is for a minimum of 26,500—a maximum of 31,600. The loss is largely attributed to gold mines many of which because of increasing costs or because of difficulties and the cost of rehabilitation, may not be reopened.

Whenever the need for employment is serious enough, gold mining may absorb several thousand additional workers but at wage rates low enough to permit operation.

While labor may not be able to fully maintain its wartime increases in wage rates, yet it is believed that because of higher rates which will prevail, the total payroll in the mining industry will nevertheless be about that of 1940.

Wartime restrictions have prevented many concerns from building new plants, enlarging existing structures and replacing worn or obsolete equipment. Plans for these activities have been made, with work to be started whenever men and materials are available. Sixty cases of this kind have been reported in the course of this investigation, and while it is not possible to estimate either labor or materials involved, it is certain to provide employment to a considerable number in construction and also larger permanent employment because of expansion of facilities.

California mineral reserves are huge. Twenty-five mineral substances occur in such amounts that, notwithstanding they have already yielded nearly four billion dollars, known reserves are still enough to last 50 to 100 years. This does not include petroleum nor natural gas.

Because of the wide variety of mineral substances, the substantial reserves, adequate fuel and increasing markets, it is believed that with adequate collection of data and planning, the mineral resources may form the basis of a largely expanded chemical industry. These are discussed in detail in the chapter by Herbert Waterman herein (see pp. 60-70.)

Discussions are occurring in Washington and elsewhere leading to the establishment of a National Mineral Policy. Some of the proposals, if adopted, may cause acute distress in important parts of the California mineral industry. These are related to foreign trade treaties, a possible reduction or extinction of some mineral tariffs, conservation plans and policies with respect to minerals in public lands.

PLACE AND FUNCTION OF MINERALS IN THE STATE'S ECONOMY

The history of California as an economic body began with the discovery of gold. Not all the hardy pioneers, however, confined their efforts to search and production of the yellow metal, for the records show that as early as 1850 quicksilver mining commenced; in 1861 coal was being mined, sulphur was produced in 1865, borax made its appearance in 1864 and chromite in 1869. Lead and silver appeared in the records about 1877 and the first statistical compilation made in 1886 by the newly established State Mining Bureau, gave a long list of minerals, production of which preceded that date. These included antimony, asbestos, bituminous rock, clay, copper, granite, gypsum, iron ore, magnesite, manganese, marble, mineral water, paving blocks, platinum, salt and sandstone. Petroleum was recorded first in 1875. Notwithstanding this formidable list, the value of all mineral output in 1887 was under 20 million dollars; less than 5 percent of the 429 million dollars produced 56 years later, in 1943.

Those who seek to establish the premise that mineral reserves are near exhaustion can find little evidence of declining production in California to support such an hypothesis.

The recorded contribution of minerals to the welfare of the State from the beginning to the close of 1943 was the formidable sum of \$11,189,489,653. Without the impetus of this continual flow from the mineral cornucopia, California could not have reached its present industrial magnitude.

While there have been years in which declines in output have been recorded, these have in every instance coincided with the drop in other industrial activity and were the result of reduced demand and not because mineral supplies were becoming scarce. The trend is constant and were it not for the idleness enforced upon gold mining, the year 1943 would have shown the highest total of mineral production in the history of the State. As it is, 1943 mineral output has been exceeded only by that of 1925, 1926 and 1929.

No other comparable area on earth is there known to have such a wide variety of mineral products. In Table 1, 70 of these are specially mentioned and the impressive list could be extended by breaking down certain group classifications such as magnesium compounds and platinum metals.

TABLE 1

Total Value of Mineral Production in California, Since Year First Reported to 1943, Inclusive

Substance	Total value	Year first reported
Antimony	$225,478	1887
Asbestos	162,872	1887
Barite	2,461,600	1910
Bentonite	2,591,923	1899
Bituminous rock	4,585,162	1887
Borates	128,874,462	1864
Brick and hollow building tile	162,113,218	1893
Bromine	3,187,444	1926
Calcium chloride	1,301,335	1921
Carbon dioxide	938,346	1894
Cement	552,278,854	1891
Chromite	11,281,214	1869
Clay (pottery)	20,929,896	1887
Coal	23,398,108	1861
Copper	190,534,920	1882
Diatomite	33,567,549	1889
Dolomite	3,214,750	1915
Feldspar	1,062,633	1910
Gold	2,246,287,561	1848
Granite	28,866,406	1887
Grinding mill pebbles	283,955	1915
Gypsum	9,299,995	1887
Iodine	5,510,157	1929
Iron ore	4,028,462	1881
Lead	14,002,145	1877
Lime	24,291,890	1894 (to 1942 inc.)
Limestone	20,759,168	1894
Lithia	716,221	1899
Magnesite	16,684,656	1887
Magnesium compounds	12,788,822	1916
Manganese ore	3,840,347	1887
Marble	3,568,420	1887
Mineral paint	237,399	1890
Mineral water	37,958,407	1887
Molybdenum	1,394,894	1916
Natural gas	459,978,736	1888
Paving block	5,357,134	1887
Petroleum	6,305,704,311	1875
Platinum metals	1,179,254	1887
Potash	69,067,308	1914
Pumice—Volcanic ash	2,404,271	1909
Pyrites	14,485,587	1898
Quicksilver	138,661,446	1850
Salt	38,431,833	1887
Sandstone	4,662,728	1887
Semi-precious stones and crystals	2,604,232	1900
Silica (quartz and glass sand)	5,861,336	1899
Sillimanite group	929,946	1922
Silver	70,592,590	1880
Slate	1,254,134	1889
Soda	39,912,050	1894
Stone, miscellaneous	399,854,680	1893
Strontium	202,293	1916
Sulphur	829,399	1865
Talc	6,890,954	1893
Tungsten	36,253,592	1905
Zinc	10,431,854	1906
Miscellaneous*	711,316	
Total	$11,189,489,653	

* Includes Alum minerals, Arsenic, Bismuth, Fluorite, Cadmium, Calcium Silicate, Graphite, Mica, Onyx, Travertine, Serpentine, Shale Oil, Tin, Titanium, Zircon.

The question has been raised frequently as to which of these minerals have been the more important. The relative rank changes from time to time but in Table 2, showing the all-time totals of value; as well as Table 3, giving the relative positions in 1939 (a pre-war year), petroleum and natural gas hold the predominant lead, with gold, cement and miscellaneous stone, sand and gravel following in the order stated. Gold in 1943 does, of course, occupy a junior position because most operations

were closed, thus giving Portland cement second place. Potash, a relatively new-comer, having appeared first in 1914, had risen to sixth in importance in 1939. Diatomite not yet occupying a place in the "all-time" list, commenced its real growth about the turn of the century, and in 1939 was eleventh in rank.

TABLE 2

Total Value of the 15 Most Important Mineral Products in California Since First Year Reported to 1943, Inclusive

	Total value	Year first reported
1. Petroleum and natural gas	$6,765,683,047	1875
2. Gold	2,246,287,561	1848
3. Cement	552,278,854	1891
4. Miscellaneous stone, sand and gravel	399,854,680	1893
5. Copper	190,534,920	1882
6. Brick and hollow tile	162,113,218	1893
7. Quicksilver	138,661,446	1850
8. Borates	128,874,462	1864
9. Silver	70,592,590	1880
10. Potash	69,067,308	1914
11. Lime and limestone	45,051,058	1894
12. Soda	39,912,050	1894
13. Salt	38,431,833	1887
14. Mineral water	37,958,407	1887
15. Tungsten ore	36,253,592	1905

TABLE 3

Total Value of the 15 Most Important Mineral Products in California in 1939

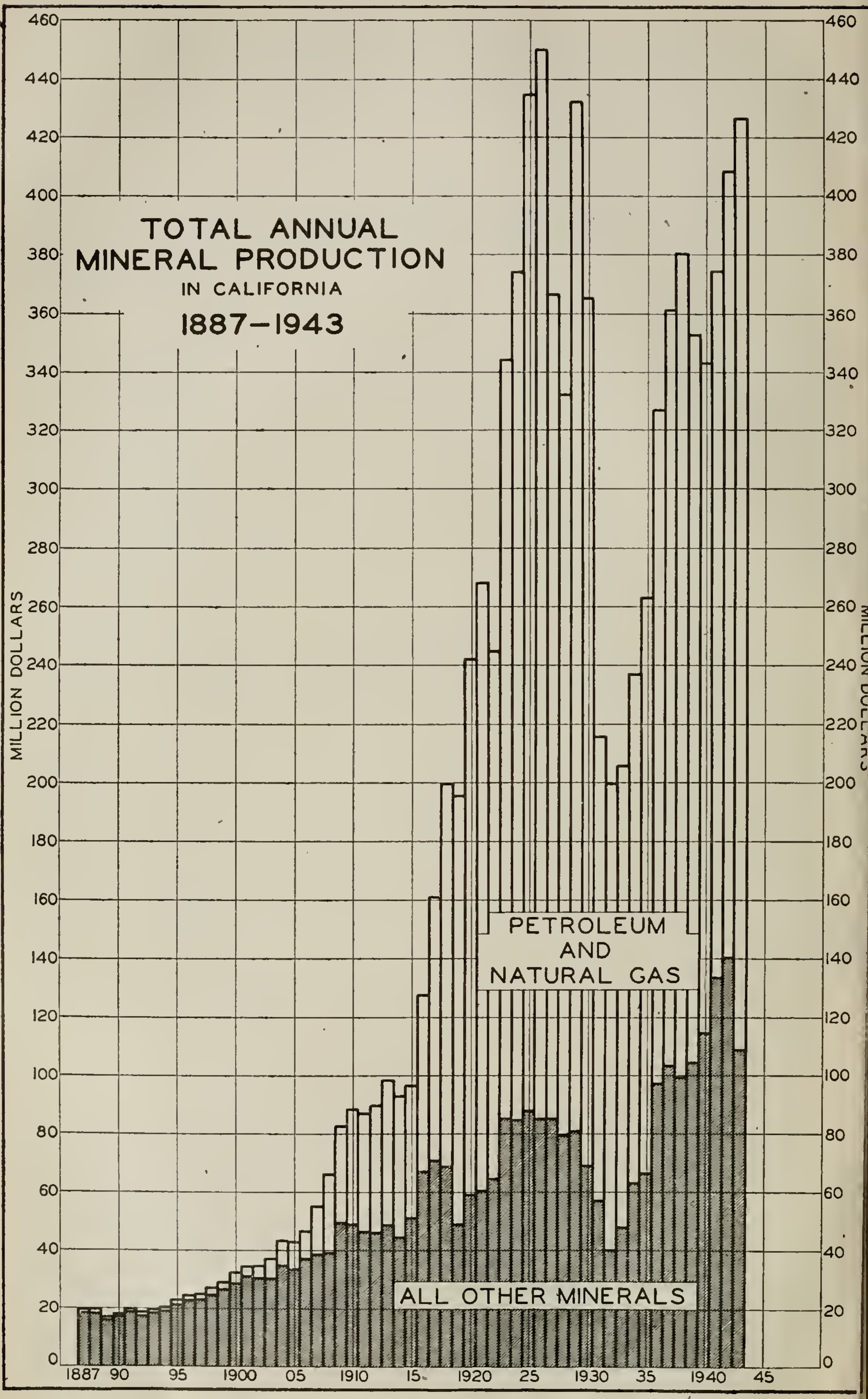
	Value
1. Petroleum and natural gas	$247,910,502
2. Gold	50,234,240
3. Cement	15,616,219
4. Miscellaneous stone, sand and gravel	10,316,787
5. Borates	5,110,807
6. Potash	[1]4,528,933
7. Brick and hollow tile	3,063,660
8. Soda	2,055,608
9. Silver	1,764,264
10. Lime and limestone	1,687,357
11. Diatomite	[2]1,313,980
12. Salt	1,174,386
13. Tungsten ore	1,153,735
14. Quicksilver	1,102,563
15. Copper	872,582

[1] Average of 1938 and 1939.
[2] Average of 1938-1940.

Growth of Mineral Output

When statistics were first compiled in 1887, mineral output was less than 20 million dollars, of which petroleum amounted to but $1,357,-144. After hovering for seven years around that level, there began an expansion which continued unbroken, with minor fluctuations, until the depression years of 1930, 1931 and 1932. Having fallen to less than 200 million dollars in 1932 for the first time since reaching that figure first in 1920, the upward course was resumed in 1933 and has continued since then.

The figures of total value, given in Table 4, are graphically presented in Figure I.


TOTAL ANNUAL
MINERAL PRODUCTION
IN CALIFORNIA
1887–1943
PETROLEUM
AND
NATURAL GAS
ALL OTHER MINERALS
MILLION DOLLARS
MILLION DOLLARS
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
320
340
360
380
400
420
440
460
1887
90
95
1900
05
1910
15
1920
25
1930
35
1940
45

The effect of war has been to increase the output and value in some materials, but these increases have been offset to some extent by the drop in gold production and in some other minerals dependent in part on foreign markets. As the prices of most of these products were fixed by the Office of Price Administration the gains shown were due chiefly to larger output. Exceptions to this were copper, lead and zinc receiving premium prices; chromite, manganese, and tungsten sold at advanced schedules to Metals Reserve Company, and quicksilver which showed

TABLE 4

Total Mineral Production of California, by Years, Since 1887

Year	Total value of all minerals	Gold, value	Petroleum, value
1887	$19,785,868	$13,588,614	$1,357,144
1888	19,469,320	12,750,000	1,380,666
1889	16,681,731	11,212,913	368,048
1890	18,039,666	12,309,793	384,200
1891	18,872,413	12,728,869	401,264
1892	18,300,168	12,571,900	561,333
1893	18,811,261	12,422,811	608,092
1894	20,203,294	13,923,281	1,064,521
1895	22,844,663	15,334,317	1,000,235
1896	24,291,398	17,181,562	1,180,793
1897	25,142,441	15,871,401	1,918,269
1898	27,289,079	15,906,478	2,376,420
1899	29,313,460	15,336,031	2,660,793
1900	32,622,945	15,863,355	4,152,928
1901	34,355,981	16,989,044	2,961,102
1902	35,069,105	16,910,320	4,692,189
1903	37,759,040	16,471,264	7,313,271
1904	43,778,348	19,109,600	8,317,809
1905	43,069,227	19,197,043	9,007,820
1906	46,776,085	18,732,452	9,238,020
1907	55,697,949	16,727,928	16,783,943
1908	66,363,198	18,761,559	26,566,181
1909	82,972,209	20,237,870	32,398,187
1910	88,419,079	19,715,440	37,689,542
1911	87,497,879	19,738,908	40,552,088
1912	88,972,385	19,713,478	41,868,344
1913	98,644,639	20,406,958	48,578,014
1914	93,314,773	20,653,496	47,487,109
1915	96,663,369	22,442,296	43,503,837
1916	127,901,610	21,410,741	57,421,334
1917	161,202,962	20,087,504	86,976,209
1918	199,753,837	16,529,162	127,459,221
1919	195,830,002	16,695,955	142,610,563
1920	242,099,667	14,311,043	178,394,937
1921	268,157,472	15,704,822	203,138,225
1922	245,183,826	14,670,346	173,381,265
1923	344,024,678	13,379,013	242,731,309
1924	374,620,789	13,150,175	274,652,874
1925	434,519,660	13,065,330	330,609,829
1926	450,330,856	11,923,481	345,546,677
1927	366,781,394	11,671,018	260,735,498
1928	332,224,233	10,785,315	229,998,680
1929	432,248,228	8,526,703	321,366,863
1930	365,604,695	9,451,162	271,699,046
1931	215,964,420	10,814,162	141,835,723
1932	199,196,493	11,765,726	142,890,247
1933	206,489,058	15,683,075	143,063,972
1934	237,374,709	25,131,284	159,529,671
1935	263,404,317	31,165,050	179,335,311
1936	327,804,268	37,710,470	211,667,185
1937	361,515,951	41,110,230	237,845,872
1938	380,444,976	45,889,515	258,345,343
1939	352,462,564	50,234,240	226,358,856
1940	342,825,817	50,948,485	207,479,800
1941	374,326,228	49,307,755	218,838,171
1942	409,482,203	29,679,895	242,481,542
1943	429,033,190	5,191,480	289,323,406
Totals 1887-1943	$9,952,429,076	$1,098,801,118	$6,302,089,791
Production before 1887	$1,237,060,577		
Grand total	$11,189,489,653		

sharp advances in prices in the immediate prewar years and continued in some cases to hold these high levels. Had gold mining been permitted to operate in 1943, California value of output would probably have reached an all-time peak, notwithstanding labor shortages. However, production for that year fell short of the 1926 high of $450,330,856 by about 20 million dollars.

Mineral Production During War Period

The productive position of the various industries in 1942-1943 is shown in Table 5.

Of 35 minerals for which specific tonnages and values are given, 11 show a falling off in value in 1943 as compared with the previous year.

The greatest drop was in gold which fell 82.5 percent.

Decreases in 1943 as compared with 1942 were as follows:

	Decrease per cent value	Decrease in value
Gold	82.5	$21,488,415
Silver	58.0	598,304
Pumice	31.9	66,874
Brick—hollow tile	23.5	1,340,292
Silica (quartz and glass sand)	23.0	159,328
Cement	22.2	7,943,375
Granite	20.7	38,712
Stone, miscellaneous	20.4	5,565,119
Carbon dioxide	19.9	61,874
Salt	11.8	227,760
Clay (pottery)	1.3	15,053

The heavy drop in consumption of cement, miscellaneous stone, and in clay used in brick and hollow tile, was due largely to the completion of military projects, shortage of labor, and continued imposition of priorities retarding civilian construction.

Against these losses, gains are recorded in 17 minerals. In percentage, copper, with an increase of 765 percent, led the list in percentage but not in total value. Petroleum increased but 19.3 percent in 1943 with value of output up $46,841,861, more than twice the loss of gold value for that year.

Iron ore increased 530 percent in value and over 800 percent in quantity. Other increases are shown in Table 5. It is notable that these substantial gains were offset in large measure by losses, with a net gain for the entire industry of but 2 percent over 1942 value of production.

The impact of war on various groups according to classification of the California Division of Mines (Bulletin 126, 1943) is shown in Table 6. Commencing with 1940 there is shown a continuous growth in metals (other than gold) and in petroleum and Industrial Materials. Gold has, of course, shown a continuous and abrupt decline, while salines, after reflecting the loss of export trade in 1941, remained in 1942 and 1943 at a level about 10 percent above that of the prewar years of 1940-1941.

TABLE 5

Distribution of the 1942 and 1943 Output of California Substances

Substance	1942		1943		Value Increase+ Decrease— percent
	Amount.	Value	Amount	Value	
Antimony	*	*	*	*	
Asbestos	8,319 lbs.	$836	*	*	
Bentonite	7,453 tons	67,503	11,480 tons	$118,257	75.0+
Borates	203,716 tons	4,929,553	216,687 tons	4,953,174	0.5+
Brick and hollow building tile	----------	5,708,967	----------	4,368,675	23.5—
Carbon dioxide	193,143 M cu.ft.	310,000	227,424 M cu.ft.	248,126	19.9—
Cement	23,306,578 bbls.	35,808,841	18,515,085 bbls.	27,865,466	22.2—
Chromite	*	*	*	*	
Clay (pottery)	622,958 tons	1,200,293	622,019 tons	1,185,240	1.3—
Copper	2,138,149 lbs.	258,716	17,172,440 lbs.	2,232,417	765.0+
Dolomite	142,552 tons	413,469	331,251 tons	472,756	14.4+
Semi-precious stones and crystals	----------	570	----------	329,868	
Gold	827,997 fine ozs.	29,679,895	148,328 fine ozs.	5,191,480	82.5—
Granite	----------	186,872	----------	148,160	20.7—
Gypsum	425,268 tons	791,892	495,967 tons	916,883	15.8+
Iron ore	99,092 tons	371,562	907,458 tons	2,341,827	530.0+
Lead	10,329,176 lbs.	692,054	11,811,034 lbs.	885,827	28.0+
Limestone	474,764 tons	1,155,352	495,262 tons	1,378,647	19.3+
Magnesium compounds	37,363 tons	2,088,917	69,686 tons	3,868,716	85.0+
Manganese ore	*	*	*	*	
Marble[a]	*	*	*	*	
Mineral water	17,559,686 gals.	567,897	22,022,314 gals.	814,700	43.4+
Natural gas	413,180,942 M cu.ft.	25,698,052	443,219,847 M cu.ft.	28,046,729	9.1+
Petroleum	247,491,289 bbls.	242,481,545	284,145,702 bbls.	289,323,406	19.3+
Pumice and volcanic ash	55,603 tons	209,539	21,154 tons	142,665	31.9—
Quicksilver	30,087 flasks	5,553,357	33,948 flasks	6,177,159	11.2+
Salt	672,324 tons	1,922,991	631,776 tons	1,695,231	11.8—
Sandstone	----------	8,587	*	*	
Silica (quartz and glass sand)	193,174 tons	692,762	161,318 tons	533,434	23.0—
Silver	1,450,440 fine ozs.	1,031,424	609,075 fine ozs.	433,120	58.0—
Soapstone and talc	47,782 tons	545,509	63,012 tons	723,056	35.9+
Soda (soda ash and salt cake)	267,723 tons	3,125,078	260,590 tons	3,166,576	1.3
Stone (miscellaneous)	----------	27,281,342	32,499,456 tons	21,716,223	20.4—
Tungsten	231,201 units	5,586,770	254,118 units	5,910,745	5.8+
Zinc	1,275,795 lbs.	118,659	5,170,627 lbs.	558,427	370.0+
Unapportioned ([b])	----------	10,993,399	----------	13,286,200	
Totals	----------	$409,482,203	----------	$429,033,190	2.0+

* Included under 'Unapportioned.'
([a]) Includes onyx and travertine.
([b]) Includes asbestos, barite, bituminous rock, bromine, calcium chloride, calcium silicate, chromite, coal, diatomite, feldspar, iodine, iron ore, lithia, magnesite, manganese ore, mica, mineral paint, molybdenum, paving block, platinum group metals, potash, pyrite, sandstone, sillimanite group, slate, strontium, titanium, zircon, tube-mill pebbles.

TABLE 6

Effect of War on Mineral Production in California

	1939	1940	1941	1942	1943
Petroleum and natural gas	$247,910,502	$228,098,693	$240,361,667	$268,179,597	$317,370,135
Gold	50,234,240	50,948,485	49,307,755	29,679,895	5,191,480
Metals (other than gold)	5,141,633	9,001,353	12,288,157	16,505,990	22,511,638
Structural materials	30,373,840	34,280,220	51,214,589	69,418,998	54,451,608
Industrial materials	5,622,449	6,388,748	8,502,571	8,606,428	10,706,955
Salines	13,550,499	14,332,819	12,880,033	17,091,240	18,801,051
Totals	$352,834,564	$343,024,918	$374,554,712	$409,482,203	$429,033,190

Productive Position in 1944

Notwithstanding that at the time this report is written, the war in Germany is still being fought in its bitterest phase, and that war in the Pacific is taking on an increasing tempo, the mineral industry in the United States is suffering from what might be regarded as postwar depression.

Minerals which on Decmber 7, 1941, were regarded as ''strategic'' or ''critical'' are in many cases now in abundant supply, and concern has changed from how to supply a serious deficiency to one of how to treat a surplus. The supply now available is in such amounts that large above-ground surpluses of some minerals overhang the industry.

Some of the immediate threat of demoralization of industry from postwar surpluses has been dispelled by the passage of the Surplus War Property Disposal Bill. This measure has been criticized by both the administration and by industry as being inadequate, nevertheless it does serve to prevent immediate dumping of materials which properly belong in a stockpile, and establishes the intent of Congress to guard against demoralization of industry such as occurred in the World War I postwar years. It may be regarded as an experimental measure which may be perfected by later legislation.

Activity of the mining industry in California during 1942, 1943 and 1944 was directed mainly to the development and production of substantial supplies of war minerals which do not constitute so important a part of its normal peacetime output. Offsetting these increases there was a precipitous drop in gold production.

As this report is written most of mineral output has already fallen far below the peak output of 1942-43. and further contraction is expected to follow in 1945. Statistics of cement production regarded as typical of construction materials, shows a drop of about 22 percent in 1943 below the peak output accomplished in 1942. A further drop is indicated for 1944. A large number of operations which in 1943 produced tungsten, chromite, manganese, quicksilver, and other mineral products are now idle.

Mineral production since 1941 has been largely for war purposes with civilian consumption playing a minor role. The problem is, therefore, the restoration of manufacture for civilian consumption at a rate sufficient to prevent unemployment. While production has, as pointed out, fallen abruptly in many mineral industries, that portion still active continues to suffer from labor shortage; particularly for want of common labor. So long as this condition persists there is, of course, no serious problem of unemployment.

Normally gold mining requires 13,000 to 14,000 men. Under the prohibition of War Production Board Order L-208 this has been reduced to 800, chiefly engaged in maintenance. Cancellation of that order would apparently therefore have little effect in the resumption of these activities. Wage levels in gold mining are considerably under those of war industries in the State, including those producing war minerals, and any substantial resumption of gold mining must be predicated on a more plentiful labor supply willing to work in many cases at somewhere around levels prevailing in 1939. In cases where the margin in gold mining is

wide enough to absorb higher wages, there still remains the problem of obtaining government approval of wage advances, and the availability of power, fuel, transportation and supplies.

In some large mineral industries, notably clay, cement, salines, sand-gravel and crushed stone, and a considerable group of medium sized concerns operating with less than full crews, labor deficiency will absorb much of any new supply for some time to come. These industries expect civilian peacetime demand, and in some cases foreign trade, to require maximum employment and in some industries to increase beyond war and prewar schedules.

As indicated above, the resumption of gold mining on a scale such as prevailed in 1939, is in doubt. Even with plentiful labor and supplies, many operations cannot resume if required to meet wage scales now prevailing both in mining of other mineral products and in industry generally. Here, however, is a reservoir of potential employment which can provide work for 14 to 15 thousand men whenever the need for such employment is great enough. The conclusion has been expressed in some quarters that so long as gold mines remain idle for the reasons above stated, substantial unemployment in other industries may bring about the adjustment of wages to a level that would permit the reopening of gold mines which are unable to operate at wage levels likely to prevail in the immediate postwar period.

Expenditures by the Mineral Industries

In the 16th U. S. Census an attempt was made to determine the expenditures of the mineral industries for 1939. The total recorded was $55,714,000. This is admittedly incomplete and omits entirely some elements.

According to statistics of the California Division of Mines, mineral production for 1939 amounted to $104,924,062 (not including petroleum and natural gas). For such portion of the industry as was covered, the figures may hold some interest insofar as the proration of expenditures is concerned.

TABLE 7

California Mineral Industry Expenditures in 1939[1] in Thousand of Dollars and Percent of Total

	Wages and salaries	Supplies and materials	Purchased electrical energy	Machinery and equipment	Total expenditures
All mining[2]	$30,030	$15,638	$4,924	$5,122	$55,714
Percent	53.9	28.0	8.8	9.1	
Metal Mining	$17,751	$8,168	$2,740	$3,930	$32,589
Percent	54.4	25.0	8.4	12.5	
Gold	15,869	7,405	2,549	3,550	29,373
Percent	54.0	25.2	8.6	12.0	
Other metals	1,882	763	191	380	3,216
Percent	58.2	23.7	5.9	11.8	
Non-metallic mining	12,279	7,470	2,184	[3]1,192	23,125
Per cent	53.0	32.5	9.4	5.1	

[1] Compiled from statistics of 16th U. S. Census.
[2] Statistics not complete. Many small operations not included. Bromine, iodine, magneisum compounds and salt from brines not included.
[3] Cement mills, brick and hollow tile plants not included.

Distribution of Mineral Reserves and Production in Each County

The impression, prevalent in some quarters, that mineral production is confined to the mountainous regions of the State is not borne out by statistics of production. Only two counties, Alpine and Sutter, have an all time record of less than one million dollars, and both of these are mountainous counties. On the contrary some of the valley areas have been the largest contributors to the mineral wealth of California yielding gold, petroleum, natural gas, gypsum, clay, sand, gravel and other products.

It is notable that every county in the State produces minerals to some extent. San Francisco County, notwithstanding its limited area and concentrated population, produced mineral products of a value of \$432,500 in 1943. This was composed chiefly of crushed rock, sand, gravel, mineral water and at times there is production of gold and silver from beach sands. Because of its large population, the per capita production is less than \$1.00. Expenditures for machinery, equipment and supplies used in these operations are not limited to San Francisco County and are likely reflected in manufacturing production in Alameda, Santa Clara and other counties.

On the basis of 1940 U. S. Census, the value of mineral output in 1942 for each man, woman and child resident of each county, is shown in Table 8. In urban areas of dense population, the per capita value becomes less, with mineral value distributed over tens of thousands of residents engaged in divergent occupations unrelated to the mineral industries.

In contrast to this is the high per capita rate prevailing in Inyo County where the per capita value of output in 1942 was \$1,067.00, based upon a poulation of 7,625 (Census of 1940). The population in 1942 had probably increased considerably but the high rate of dependence on the mineral industry is nevertheless still evident.

In Los Angeles County the value per capita was but \$38.00 in 1942 of which petroleum and natural gas amounted to \$32.00. Nevertheless the total for that year was the imposing amount of \$106,120,578.

The significance is not, however, limited to the dollar value per capita, as there is much inter-county commerce in farm and other products, and all producing counties trade with major market centers such as Los Angeles, Bakersfield, Fresno, Sacramento and San Francisco. A county of small mineral production may therefore be heavily dependent on trade originating from counties with larger output.

There are various other elements which contribute to inter-county dependence. Labor employed seasonally in farming areas is drawn to some extent from mining regions and conversely farm labor finds employment in mines in off-season periods.

The value of minerals produced by each county beginning with the first year in which records have been kept is given in detail in the tables in Appendix B.

Table 8 also shows the importance of gold in 1940, and its abrupt fall since that date in each county. In 18 counties gold was of major importance to the local economy before the war, output in each exceeding \$500,000 in 1940, and 15 counties the value for that year was over

one million dollars. Production of gold in 1940 came from 43 of the 58 counties and amounted to $50,948,485. In 1943 however only Butte, Nevada and Sacramento counties exceeded $500,000 and the total for the State, coming from 28 counties had fallen to $5,191,480, a drop of nearly 90 percent. When 1944 figures are published they will show further shrinkage probably to around $3,700,000.

TABLE 8

Per Capita Mineral Value Based on 1942 Production, by County in Order of Total Value of Output

County	1940 population (thousands)	Total mineral output	Petroleum and natural gas	Metals and non-metallics	Gold value		
					1940	1942	1943
Los Angeles	2,786	$38	$32	$6	--------	--------	--------
Kern	135	559	502	57	$21	$15	$1
Orange	131	210	204	6	--------	--------	--------
Fresno	179	138	135	3	--------	--------	--------
San Bernardino	161	153	--------	153	3	2	--------
Ventura	70	329	320	9	--------	--------	--------
Kings	35	370	370	0	--------	--------	--------
Santa Barbara	71	161	136	25	--------	--------	--------
Sacramento	170	58	23	35	33	26	3
Santa Clara	175	53	--------	53	--------	--------	--------
Inyo	[a]7,625	1,067	--------	1,067	55	54	20
Riverside	106	65	--------	65	1	--------	--------
Alameda	513	12	--------	12	--------	--------	--------
Nevada	19	313	--------	313	598	309	43
Contra Costa	100	41	--------	41	--------	--------	--------
Shasta	29	139	--------	139	53	24	3
San Mateo	112	35	--------	35	--------	--------	--------
Santa Cruz	45	78	--------	78	--------	--------	--------
Yuba	17	191	--------	191	229	156	79
San Benito	11	282	--------	282	--------	--------	--------
Calaveras	[a]8,221	365	--------	365	371	120	15
Solano	49	56	54	2	--------	--------	--------
Butte	43	56	--------	56	60	50	12
Amador	9	232	--------	232	460	193	10
San Joaquin	134	16	6	10	3	5	1
Merced	47	39	--------	39	39	15	--------
Sonoma	69	24	--------	24	--------	--------	--------
Siskiyou	29	56	--------	56	72	47	4
Stanislaus	75	20	--------	20	17	13	4
Napa	19	76	--------	76	--------	--------	--------
Placer	28	48	--------	48	86	30	2
Mariposa	[a]5,605	236	--------	236	170	184	41
El Dorado	13	101	--------	101	103	49	--------
San Diego	289	4	--------	4	--------	--------	--------
Trinity	[a]3,970	265	--------	265	437	214	8
San Luis Obispo	33	31	--------	31	--------	--------	--------
Tuolumne	11	78	--------	78	70	41	33
Lake	8	104	--------	104	--------	--------	--------
Sierra	[a]3,025	212	--------	212	317	209	55
Yolo	27	23	--------	23	--------	--------	--------
Monterey	73	7	--------	7	--------	--------	--------
Imperial	60	8	--------	8	4	--------	--------
Glenn	12	45	--------	45	--------	--------	--------
Del Norte	[a]4,745	84	--------	84	--------	--------	--------
Plumas	12	29	--------	29	124	24	1
Humboldt	46	6	--------	6	1	3	--------
Marin	53	4	--------	4	--------	--------	--------
Tulare	107	2	--------	2	--------	--------	--------
Mono	[a]2,299	61	--------	61	231	33	--------
Mendocino	28	5	--------	5	--------	--------	--------
San Francisco	635	--------	--------	--------	--------	--------	--------
Sutter	19	5	--------	5	--------	--------	--------
Madera	23	4	--------	4	2	1	--------
Modoc	[a]8,713	6	--------	6	--------	--------	--------
Tehama	14	3	--------	3	--------	--------	--------
Colusa	10	4	--------	4	--------	--------	--------
Lassen	14	3	--------	3	--------	--------	--------
Alpine	[a]323	10	--------	10	--------	--------	--------
All California	6,907	59	39	20	7	4	1

[a] Total population of county (not thousands).

Table 9 shows the total value of mineral production of each county since records were first kept, to December 31, 1943, inclusive.

TABLE 9

Total Recorded Mineral Production by Counties

County	Total value	Year first recorded
Alameda	$88,460,889	1890
Alpine	366,260	1880
Amador	151,523,540	1880
Butte	75,933,659	1880
Calaveras	123,650,158	1880
Colusa	4,062,741	1875
Contra Costa	68,729,657	1894
Del Norte	4,661,799	1880
El Dorado	42,906,813	1880
Fresno	541,163,821	1880
Glenn	3,556,188	[1]1893
Humboldt	11,801,243	1880
Imperial	10,248,333	[2]1907
Inyo	103,656,778	1880
Kern	1,913,506,389	1880
Kings	229,559,090	1894
Lake	20,553,823	1873
Lassen	2,540,650	1880
Los Angeles	2,897,799,920	1880
Madera	15,244,317	1893
Marin	13,426,367	1888
Mariposa	28,146,517	1880
Mendocino	1,816,033	1880
Merced	28,137,579	1880
Modoc	1,441,172	1880
Mono	32,849,118	1880
Monterey	9,875,750	1889
Napa	42,774,753	1862
Nevada	236,146,097	1880
Orange	871,998,307	1889
Placer	59,908,684	1880
Plumas	81,898,958	1880
Riverside	129,772,672	1891
Sacramento	127,630,402	1880
San Benito	56,059,851	1865
San Bernardino	396,303,220	1880
San Diego	39,692,755	1880
San Francisco	8,498,750	1894
San Joaquin	24,289,768	1885
San Luis Obispo	13,780,988	1876
San Mateo	50,964,995	1895
Santa Barbara	290,886,188	1881
Santa Cruz	94,310,635	1894
Santa Clara	104,391,786	1850
Shasta	201,007,676	1880
Sierra	53,446,695	1880
Siskiyou	47,356,154	1880
Solano	59,244,342	1873
Sonoma	19,228,471	1873
Stanislaus	19,298,003	1880
Sutter	548,800	1908
Tehama	1,567,877	1880
Trinity	47,572,471	1875
Tulare	13,280,816	1880
Tuolumne	54,765,796	1880
Ventura	466,227,715	1880
Yolo	2,560,479	1873
Yuba	107,319,775	1880

[1] And previous.
[2] Imperial County was created August, 1907, from a part of San Diego County.

The wide distribution and diversity of mineral operations is shown in Table 10 covering 998 operations in 1942. These produced 53 different minerals or metals. In number they are far less than those usually listed in peacetime. In 1940, for example, the Directory of Producers (see Appendix A) listed 1866 producing gold mines, whereas in 1942, this had fallen to 862. By 1943 the list of active gold mines had dropped to 221.

TABLE 10
MINERAL OPERATIONS IN 1942—BY COUNTIES
From Bulletin 126. California Division of Mines

Mineral	1942 Number of operations	County
Antimony	3	Inyo, San Benito
Asbestos	3	Napa, Placer, Shasta
Barite	2	Mariposa, Nevada
Bentonite (Fullers Earth)	8	Inyo, Kern, San Bernardino, San Diego
Bituminous Rock	2	Santa Barbara, Santa Cruz
Borates	5	Inyo, Kern, San Bernardino
Bromine	3	Alameda, San Bernardino, San Diego
Calcium Chloride	2	Imperial, San Bernardino
Calcium Silicate (Wollastonite)	1	Kern
Carbon Dioxide	2	Imperial, Mendocino
Cement	12	Calaveras, Contra Costa, Kern, Los Angeles, Merced, Riverside, San Benito, San Bernardino, San Mateo, Santa Clara, Santa Cruz
Chromite	46	Del Norte, El Dorado, Fresno, Glenn, Humboldt, Mendocino, Placer, Plumas, San Luis Obispo, Shasta, Siskiyou, Tehama, Trinity, Tuolumne
Clay and Products	101	Alameda, Amador, Butte, Calaveras, Contra Costa, Fresno, Inyo, Kern, Los Angeles, Marin, Orange, Placer, Riverside, Sacramento, San Bernardino, San Diego, San Joaquin, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, Stanislaus, Sutter, Tulare, Ventura
Coal	1	Alameda
Copper	10	Calaveras, Inyo, Madera, Mariposa, Nevada, San Bernardino, Santa Barbara, Shasta
Diatomite	4	Los Angeles, Monterey, Santa Barbara
Dolomite	7	Inyo, Los Angeles, Monterey, Riverside, San Benito, Tuolumne
Feldspar	3	Fresno, San Bernardino, San Diego
Gems, etc.	3	
Gold	202	Amador, Butte, Calaveras, El Dorado, Fresno, Humboldt, Inyo, Kern, Mariposa, Merced, Mono, Nevada, Placer, Plumas, Riverside, Sacramento, San Bernardino, San Joaquin, Shasta, Sierra, Siskiyou, Stanislaus, Trinity, Tuolumne, Yuba
Granite	11	Fresno, Lassen, Madera, Placer, Riverside, Sacramento, San Bernardino, San Diego, Sonoma, Ventura
Gypsum	11	Alameda, Imperial, Kern, Monterey, Riverside, Ventura
Iodine	2	Los Angeles
Iron	6	Inyo, San Bernardino, Shasta, Trinity
Lead	15	Inyo, Mariposa, Nevada, Placer, San Bernardino
Lime-Limestone	21	Alameda, El Dorado, Inyo, Los Angeles, San Bernardino, Riverside, San Luis Obispo, San Mateo, Santa Clara, Santa Cruz, Tuolumne, Ventura
Lithia	1	San Bernardino
Magnesite	4	Alameda, Santa Clara, Stanislaus
Magnesium Salts	5	Alameda, Imperial, San Diego, San Mateo
Manganese Ore	29	Alameda, Amador, Imperial, Humboldt, Marin, Mendocino, Nevada, Plumas, Riverside, San Bernardino, San Joaquin, San Luis Obispo, Santa Clara, Sonoma, Stanislaus, Trinity, Tulare
Marble	2	San Luis Obispo, Solano
Mineral Paint	2	San Bernardino, Stanislaus
Mineral Water	37	Butte, Colusa, Contra Costa, Lake, Los Angeles, Marin, Napa, Orange, Placer, Riverside, San Bernardino, San Diego, San Luis Obispo, Shasta, Siskiyou, Sonoma
Molybdenum	1	Inyo
Platinum (1940)	11	Merced, Sacramento, San Joaquin, Siskiyou, Stanislaus, Trinity, Yuba
Potash	1	San Bernardino
Pumice—Volcanic Ash	16	Inyo, Kern, Madera, Modoc, Mono, Napa, San Luis Obispo, Siskiyou
Pyrite	1	Shasta
Quicksilver	55	Colusa, Contra Costa, Fresno, Kings, Lake, Napa, San Benito, San Luis Obispo, Santa Barbara, Santa Clara, Siskiyou, Sonoma, Trinity, Yolo
Salt	16	Alameda, Imperial, Inyo, Kern, Los Angeles, Modoc, Monterey, Orange, San Bernardino, San Diego
Sandstone	8	Colusa, Los Angeles, Monterey, Napa, San Bernardino, San Luis Obispo, Shasta
Silica	12	Contra Costa, Kern, Mariposa, Monterey, Orange, Riverside, San Bernardino, San Diego
Sillimanite—Andalusite Group	2	Imperial, Mono
Silver	28	Amador, Butte, Calaveras, Inyo, Kern, Mariposa, Mono, Nevada, Orange, Placer, Sacramento, San Bernardino, Shasta, Tuolumne
Slate	1	El Dorado
Soapstone—Talc	12	El Dorado, Inyo, San Bernardino
Soda	7	Imperial, Inyo, San Bernardino
Stone, Miscellaneous	216	Alameda, Amador, Butte, Contra Costa, El Dorado, Fresno, Glenn, Humboldt, Imperial, Inyo, Kern, Lassen, Los Angeles, Marin, Mariposa, Mendocino, Merced, Monterey, Napa, Orange, Placer, Riverside, Sacramento, San Benito, San Bernardino, San Diego, San Francisco, San Joaquin, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, Santa Cruz, Shasta, Siskiyou, Solano, Sonoma, Stanislaus, Trinity, Tulare, Tuolumne, Ventura, Yolo, Yuba
Strontium	3	Imperial, San Bernardino
Sulphur	1	Inyo
Titanium	1	Los Angeles
Tungsten	36	Fresno, Inyo, Kern, Mono, San Bernardino, Tulare, Tuolumne
Zinc	4	Inyo, San Bernardino
Total	998	

The value of mineral production in each county during 1942 and 1943 is summarized in Table 11.

TABLE 11

Distribution by Counties for 1942 and 1943 is Given in the Following Tabulation

County	1942 value	1943 value
Alameda	$6,858,792	$6,016,784
Alpine	3,097	20,241
Amador	2,092,030	534,098
Butte	2,400,858	755,968
Calaveras	2,998,235	2,831,543
Colusa	41,710	93,486
Contra Costa	3,729,010	4,284,821
Del Norte	401,253	609,664
El Dorado	1,320,250	304,449
Fresno	24,790,524	41,039,427
Glenn	504,755	915,030
Humboldt	294,805	237,827
Imperial	507,130	685,203
Inyo	8,134,848	8,025,406
Kern	75,529,067	94,245,359
Kings	12,955,120	16,015,695
Lake	832,712	798,381
Lassen	35,236	25,353
Los Angeles	106,120,578	100,688,245
Madera	87,727	55,575
Marin	229,269	280,119
Mariposa	1,321,238	443,693
Mendocino	133,995	82,480
Merced	1,848,319	1,118,313
Modoc	53,330	28,691
Mono	140,764	56,205
Monterey	911,389	3,050,843
Napa	1,447,638	948,557
Nevada	5,956,238	890,647
Orange	27,508,497	28,068,896
Placer	1,335,034	277,283
Plumas	346,936	207,509
Riverside	7,271,099	5,452,740
Sacramento	9,884,746	6,588,998
San Benito	3,104,054	3,528,462
San Bernardino	24,638,661	22,042,939
San Diego	1,188,661	1,650,586
San Francisco	110,140	432,500
San Joaquin	2,079,078	1,621,661
San Luis Obispo	1,031,114	1,037,062
San Mateo	3,874,496	3,041,434
Santa Barbara	11,415,045	16,830,725
Santa Clara	9,204,217	8,128,250
Santa Cruz	3,506,972	2,900,752
Shasta	4,025,223	3,766,717
Sierra	64,895	176,016
Siskiyou	1,620,514	1,896,246
Solano	2,720,428	4,931,944
Sonoma	1,655,326	1,521,314
Stanislaus	1,475,362	1,112,486
Sutter	95,438	74,905
Tehama	47,533	72,917
Trinity	1,053,442	323,123
Tulare	168,743	301,292
Tuolumne	854,080	783,508
Ventura	23,084,373	25,080,976
Yolo	617,418	365,176
Yuba	3,244,771	1,734,670
Totals	$409,482,203	$429,033,190

COMMERCIAL MINERALS OF CALIFORNIA

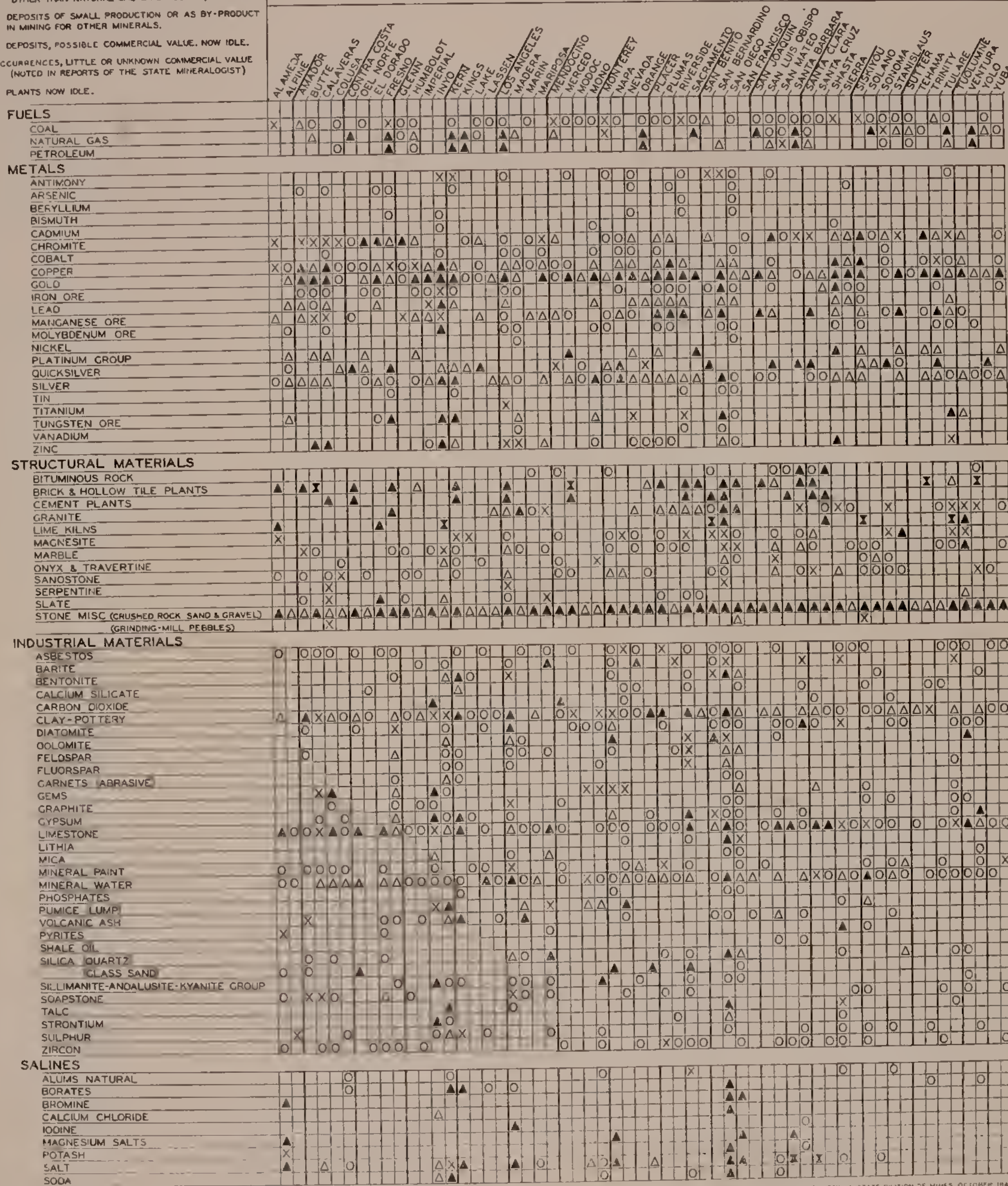
▲ DEPOSITS PRODUCING COMMERCIAL AMOUNTS 1935-44 (NAMES & ADDRESSES NOTED IN DIRECTORY OF PRODUCERS OTHER THAN NATURAL GAS & PETROLEUM)

△ DEPOSITS OF SMALL PRODUCTION OR AS BY-PRODUCT IN MINING FOR OTHER MINERALS.

X DEPOSITS, POSSIBLE COMMERCIAL VALUE. NOW IDLE.

O OCCURRENCES, LITTLE OR UNKNOWN COMMERCIAL VALUE (NOTED IN REPORTS OF THE STATE MINERALOGIST)

⧗ PLANTS NOW IDLE.



COMPILED BY CALIFORNIA STATE DIVISION OF MINES OCTOBER 1944

Postwar Outlook

The postwar outlook for cement, lime, gypsum, stone, sand and gravel, as well as some other materials entering into building construction is generally regarded as promising a high level of activity. The need for new residential construction in California is great and will become increasingly acute as war plants close down. Many war-time housing projects are not of suitable character or location for peacetime purposes.

The population increase since the 1940 Census is estimated at 1,800,000 or 26 percent. Normal housing construction to accommodate this growth has been prevented by diversion of construction materials and labor into the direct war effort.

This outlook is reflected in the estimates of employment of 18,400 men in non-metallic mining operations, as compared to 15,778 in 1940, an increase of about 17 percent.

The prospects in other sections of the mineral industry is far less clear. Gold operators are generally more optimistic of their ability to resume production than had been anticipated, notwithstanding that higher wages are apparently definite, and the cost of supplies will also be greater than in 1939-40.

If there is any prospect of an increase in the price of gold it is certainly clouded with so much uncertainty that it cannot be taken as a factor in planning.

The production of metals other than gold rose from around $5,000,000 in 1939 to over $22,000,000 in 1943. This is attributed chiefly to premium prices paid for base metals and the demand for quicksilver, tungsten, chromite, manganese and other war supplies at prices far above prewar figures. The outlook for these operations is discussed under individual mineral titles. The postwar prospects range from complete closure to maintenance of a large part of the war-time rate of operation and employment.

Employment in this group in the immediate postwar period will probably be slightly more than 50 percent of that prevailing in 1940.

For the mining industry as a whole, there is little possibility under optimum conditions of providing employment at the 1940 level when 32,628 were recorded as working in mineral extractive operations, other than petroleum. The maximum expectancy has been fixed at 31,600 with a minimum of 26,500.

▲ DEPOSITS PRODUCING COMMERCIAL AMOUNTS 1935-44. (NAMES & ADDRESSES NOTED IN DIRECTORY OF PRODUCERS OTHER THAN NATURAL GAS & PETROLEUM.)

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O OCCURRENCES, LITTLE OR UNKNOWN COMMERCIAL VALUE (NOTED IN REPORTS OF THE STATE MINERALOGIST)

⧗ PLANTS NOW IDLE.

COMMERCIAL MINERALS OF CALIFORNIA

	ALAMEDA	ALPINE	AMADOR	BUTTE	CALAVERAS	COLUSA	CONTRA COSTA	DEL NORTE	EL DORADO	FRESNO	GLENN	HUMBOLDT	IMPERIAL	INYO	KERN	KINGS	LAKE	LASSEN	LOS ANGELES	MADERA
FUELS																				
COAL	X		△	O		O		O		X	O	O			O		O	O	O	
NATURAL GAS				△			▲			▲	O	△			▲	▲	O		▲	△
PETROLEUM						O				▲		O			▲	▲			▲	
METALS																				
ANTIMONY														X	X				O	
BROMINE	▲																			
CALCIUM CHLORIDE													△							
IODINE																			▲	
MAGNESIUM SALTS	▲																			
POTASH	X																			
SALT	▲			△		O							△	X	▲				▲	
SODA													△	▲						

	MARIN	MARIPOSA	MENDOCINO	MERCED	MODOC	MONO	MONTEREY	NAPA	NEVADA	ORANGE	PLACER	PLUMAS	RIVERSIDE	SACRAMENTO	SAN BENITO	SAN BERNARDINO	SAN DIEGO	SAN FRANCISCO	SAN JOAQUIN	SAN LUIS OBISPO
FUELS																				
COAL	O		X	O	O	O	X	O		O	O	O	X	O	△		O		O	O
NATURAL GAS			△				X			▲				▲					▲	O
PETROLEUM										▲						△				△
METALS																				
ANTIMONY				O			O		O				O		X	X	O			O
BROMINE																▲	▲			
CALCIUM CHLORIDE																▲				
IODINE																				
MAGNESIUM SALTS							▲										▲			
POTASH																▲				
SALT	O				△	O	▲			△						▲	▲			O
SODA						O							O			▲				O

	SAN MATEO	SANTA BARBARA	SANTA CLARA	SANTA CRUZ	SHASTA	SIERRA	SISKIYOU	SOLANO	SONOMA	STANISLAUS	SUTTER	TEHAMA	TRINITY	TULARE	TUOLUMNE	VENTURA	YOLO	YUBA
FUELS																		
COAL	O	O	O	O	X		X	O	O	O	O		△	O			O	
NATURAL GAS	O	▲	O					▲	X	△	△	O		▲		▲	△	O
PETROLEUM	X	▲	△						O		O			△		▲		
METALS																		
ANTIMONY														O				
BROMINE																		
CALCIUM CHLORIDE																		
IODINE		O																
MAGNESIUM SALTS	▲																	
POTASH		O																
SALT	⧗		⧗		O			O										
SODA																		

COMPILED BY CALIFORNIA STATE DIVISION OF MINES OCTOBER 1944

Postwar Outlook

The postwar outlook for cement, lime, gypsum, stone, sand and gravel, as well as some other materials entering into building construction is generally regarded as promising a high level of activity. The need for new residential construction in California is great and will become increasingly acute as war plants close down. Many war-time housing projects are not of suitable character or location for peacetime purposes.

The population increase since the 1940 Census is estimated at 1,800,000 or 26 percent. Normal housing construction to accommodate this growth has been prevented by diversion of construction materials and labor into the direct war effort.

This outlook is reflected in the estimates of employment of 18,400 men in non-metallic mining operations, as compared to 15,778 in 1940, an increase of about 17 percent.

The prospects in other sections of the mineral industry is far less clear. Gold operators are generally more optimistic of their ability to resume production than had been anticipated, notwithstanding that higher wages are apparently definite, and the cost of supplies will also be greater than in 1939-40.

If there is any prospect of an increase in the price of gold it is certainly clouded with so much uncertainty that it cannot be taken as a factor in planning.

The production of metals other than gold rose from around $5,000,000 in 1939 to over $22,000,000 in 1943. This is attributed chiefly to premium prices paid for base metals and the demand for quicksilver, tungsten, chromite, manganese and other war supplies at prices far above prewar figures. The outlook for these operations is discussed under individual mineral titles. The postwar prospects range from complete closure to maintenance of a large part of the war-time rate of operation and employment.

Employment in this group in the immediate postwar period will probably be slightly more than 50 percent of that prevailing in 1940.

For the mining industry as a whole, there is little possibility under optimum conditions of providing employment at the 1940 level when 32,628 were recorded as working in mineral extractive operations, other than petroleum. The maximum expectancy has been fixed at 31,600 with a minimum of 26,500.

CALIFORNIA MINERAL RESERVES

The term "mineral reserves" is one which may be used in a limited sense to describe quantities which are definitely proved to a point where the exact tonnage may be stated. In a more general sense it includes minerals known to be present in substantial amounts, the exact figures not having been determined. Thus it will be readily agreed, for example, that sand and gravel exists in huge quantities and that therefore the "reserves" of such materials are extensive.

The definition becomes more complex when the term is enlarged to "economic mineral reserves." The introduction of the word *economic* presumes that the material shall not only be made available in requisite amounts but that a profit may be realized from its future use. The profit position of many minerals changes from time to time and *economic* reserves change accordingly with no change in quantity or grade of the mineral deposit. When quicksilver, for example, commands a price of $200 per flask, the *economic* reserves of ore expand manyfold; but these expanded reserves may be sharply contracted by a drop in price.

It is obvious therefore that no satisfactory definition can be predicated upon an insistence of a continuously available profit. In California we have extensive deposits of granite. Their ultimate extent is unknown, but they are large enough to supply any conceivable demand for 50 years, 100 years, or more. This stone cannot be quarried profitably at present, yet there is clearly a reserve adequate for any future need.

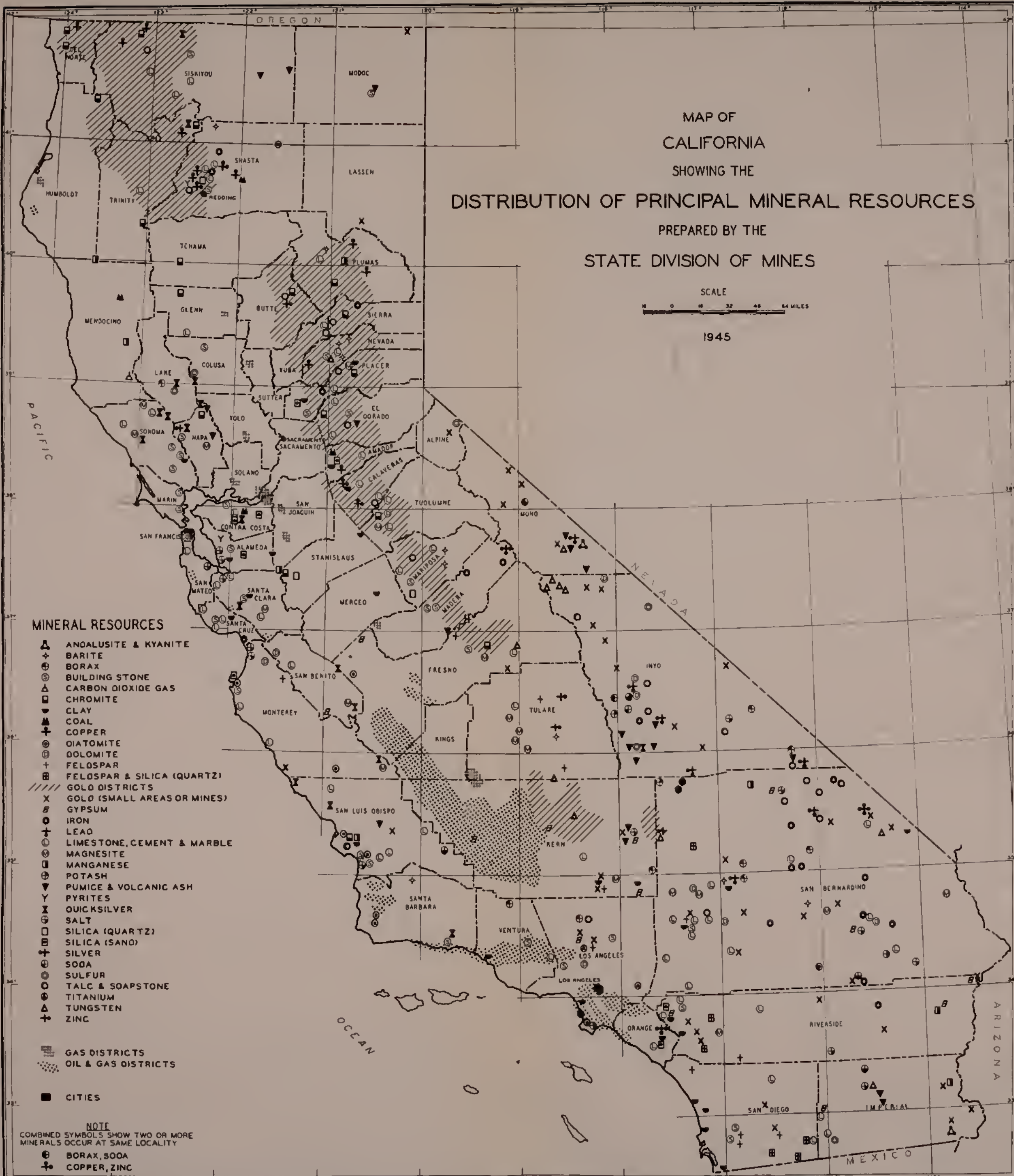
It cannot be denied that Soviet Russia, in which country profit is not essential to operation, has substantial mineral deposits and that they constitute reserves.

It must be assumed therefore that the mineral included in a reserve may in the future be mined and utilized with a reasonable expenditure of labor and materials in relation to its utility.

The term mineral *reserves,* when not qualified by the words *economic* or *ore,* is used herein in this sense, and particularly is not to be confused with the more technical term "*ore reserves*" which implies that the material must yield a profit when it is mined.

Maximum Reserves

Of 70 or more different mineral substances which have been produced in California, 25 are present in quantities which can be reasonably expected to last 50 years or longer at the average rate of production in recent years. These mineral reserves are certain to be of the greatest importance in the future economy of the State.


MAP OF
CALIFORNIA
SHOWING THE
DISTRIBUTION OF PRINCIPAL MINERAL RESOURCES
PREPARED BY THE
STATE DIVISION OF MINES
SCALE
1945
MINERAL RESOURCES
ANDALUSITE & KYANITE
BARITE
BORAX
BUILDING STONE
CARBON DIOXIDE GAS
CHROMITE
CLAY
COAL
COPPER
DIATOMITE
DOLOMITE
FELDSPAR
FELDSPAR & SILICA (QUARTZ)
GOLD DISTRICTS
GOLD (SMALL AREAS OR MINES)
GYPSUM
IRON
LEAD
LIMESTONE, CEMENT & MARBLE
MAGNESITE
MANGANESE
POTASH
PUMICE & VOLCANIC ASH
PYRITES
QUICKSILVER
SALT
SILICA (QUARTZ)
SILICA (SAND)
SILVER
SODA
SULFUR
TALC & SOAPSTONE
TITANIUM
TUNGSTEN
ZINC
GAS DISTRICTS
OIL & GAS DISTRICTS
CITIES
NOTE
COMBINED SYMBOLS SHOW TWO OR MORE MINERALS OCCUR AT SAME LOCALITY
BORAX, SODA
COPPER, ZINC
OREGON
NEVADA
ARIZONA
MEXICO
PACIFIC
OCEAN
SISKIYOU
MODOC
SHASTA
LASSEN
HUMBOLDT
TRINITY
REDDING
TEHAMA
PLUMAS
GLENN
BUTTE
SIERRA
MENDOCINO
NEVADA
PLACER
COLUSA
LAKE
YUBA
SUTTER
EL DORADO
YOLO
SONOMA
NAPA
SACRAMENTO
AMADOR
ALPINE
SOLANO
CALAVERAS
MARIN
SAN JOAQUIN
TUOLUMNE
MONO
CONTRA COSTA
SAN FRANCISCO
ALAMEDA
STANISLAUS
MARIPOSA
SAN MATEO
SANTA CLARA
MERCED
MADERA
SANTA CRUZ
FRESNO
INYO
SAN BENITO
MONTEREY
TULARE
KINGS
SAN LUIS OBISPO
KERN
SANTA BARBARA
SAN BERNARDINO
VENTURA
LOS ANGELES
ORANGE
RIVERSIDE
SAN DIEGO
IMPERIAL

They are as follows:

- Borates
- Bromine
- Building Stone
- Cement Materials
- Clay
- Diatomite
- Dolomite
- Gold
- Gravel
- Gypsum
- Iron
- Kyanite
- Lithium
- Magnesia
- Mineral Water
- Potash
- Pumice and Pumiceous Materials
- Salt
- Salt Cake
- Sand
- Silica
- Soda
- Stone, Miscellaneous
- Limestone
- Talc, Ordinary Grades

Notwithstanding that the deposits of these minerals have already been depleted to the extent of over 3 billion dollars ($3,710,026,909), reserves are still so extensive that the problem of approaching exhaustion need not be regarded with alarm for many generations.

Substantial Reserves

Included in this classification are 18 mineral materials not so plentiful as those heretofore listed, but which are known to occur in quantities that not only have already made an important contribution to the welfare of the State, but which are extensive enough so that they may be expected to yield important amounts in the future. In certain of these materials, the production has been irregular either for local economic reasons or because imports of foreign materials usually supply the markets. Such is the case with coal, which has for many years been largely replaced by petroleum, and with bituminous rock, calcium silicate, chromite and strontium minerals. Others in the group are produced regularly under normal conditions. This group has already yielded minerals of a total value of $245,784,935 and still possesses substantial reserves.

This list includes:

- Andalusite
- Barite
- Bentonite
- Bituminous Rock
- Calcium Chloride
- Calcium Silicate
- Chromite
- Coal
- Carbon Dioxide
- Feldspar
- Garnet
- Iodine
- Pyrites
- Quicksilver
- Strontium Minerals
- Sulphur
- Talc—Steatite (25 years)
- Tungsten

As is true of the larger group, these minerals are not important alone as mining operations, but in many cases they are the basic materials of manufacturing industries within the State. In manufactured form their value usually increases manyfold.

Limited Reserves

There is a wide spread in the relative abundance of minerals included in this classification, some of them having been produced in important amounts and continue to yield materials in useful quantities. They have a production record of $225,324,711, almost as great as those listed having substantial reserves. By far the most important in this group have been copper, lead and zinc which in 1943 yielded $3,676,671.

They are as follows:

- Borates
- Bromine
- Building Stone
- Cement Materials
- Clay
- Diatomite
- Dolomite
- Gold
- Gravel
- Gypsum
- Iron
- Kyanite
- Lithium
- Magnesia
- Mineral Water
- Potash
- Pumice and Pumiceous Materials
- Salt
- Salt Cake
- Sand
- Silica
- Soda
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There is a continuous record of production of copper for each year since 1882, of lead since 1877, and zinc has failed to appear in the statistics but 6 years of the past 38 since production commenced in 1906. The reserves of these metals are not definitely known. They are discussed in more detail in the chapter on Copper, Lead and Zinc. Except for recent war years, platinum, a by-product of gold dredging, has also had an unbroken record of output since 1887.

Molybdenum is produced now by a single property as a by-product of a tungsten operation. Reserves are limited by its low percentage in the ore, although output may be continuous at its present rate for some years.

The 21 minerals included under this classification are as follows:

- Antimony
- Arsenic
- Asbestos
- Bismuth
- Cadmium
- Copper
- Fluorspar
- Graphite
- Grinding Mill Pebbles
- Iceland Spar
- Lead
- Manganese Ore
- Mica
- Mineral Paint
- Molybdenum
- Platinum
- Quartz Crystals
- Semi-Precious Stones
- Tin
- Titanium
- Zinc

Reference is made to chapter titles for specific minerals, where further discussion of reserves may be found.

Exhaustion of Reserves

While individual mines go through the process of discovery, production and exhaustion, there is not a single case where a specific mineral supply formerly large, has been definitely exhausted without having been replaced by new discoveries. It is true that known reserves of copper, for example, are of moderate proportions, and production has fallen to a point where even under the stimulus of war necessity, output (in 1943) was but 17 million pounds, or about one-third of production during a similar period of World War I. Geologists are not optimistic as to the discovery of new deposits in California comparable in size to those of Arizona and Utah. There is agreement, however, in most quarters that with a favorable price and market stability, new mines could be developed in copper, lead and zinc. In various other cases the development of new sources or the utilization of known deposits is entirely a matter of economics since potential reserves are believed to exist.

Extension of Reserves by Search and Exploration

Reserves may be extended by search, exploration and development. Notwithstanding the efforts of thousands of prospectors for almost a hundred years, new discoveries are frequently reported both as new prospects and in old mines. Not all of these develop importance but out of hundreds of discoveries there emerge a few moderate sized mines and occasionally a major producer.

Methods of search and discovery have progressed along with other technological advances. The prospector and his burro have long since given way to search based on geological study and careful mapping, geophysical work, diamond drilling and various other scientific aids.

Geologic structures are better understood than formerly with the practical result that wasteful mining exploration may often be avoided.

Some minerals are not easily identified in the field and methods of making quick determinations are needed to avoid the delay and expense of forwarding specimens to some remote laboratory. In the case of scheelite, a tungsten ore, prospectors now search for the mineral at night, aided by portable ultra-violet lamps. Under this light the ore fluoresces in the dark with a brilliant glow.

It has been suggested that a new geophysical development involving the use of radar may revolutionize the search for minerals after the war.

Search and exploration of ore deposits involves risk and the risk will be undertaken only if it can be made in an atmosphere that will allow the adventurer a suitable reward if he is successful in opening up important ore deposits. Those who engage in mineral exploration expect failures for some of their ventures. Ore bodies which look promising on the surface may prove to be shallow, at other times the ore may become leaner or narrower with depth, so that the project must be abandoned and work undertaken elsewhere. Should a profitable operation be ultimately found the gains should be available to replace capital lost in earlier ventures, regardless of the lapse of time, before burdensome taxes are levied.

If new reserves are to be developed by private capital, tax laws must be revised and restrictions on the raising of capital, particularly those imposed by Federal and State Securities Commissions, should be radically liberalized. The administration of public lands should be such as to encourage rather than retard prospecting and exploration. Large areas of public domain have been withdrawn from mineral entry. Unless these factors can be remedied so as to induce development by private capital, the only alternatives are government operation or reliance on foreign sources of supply.

Prospecting, in its broader sense, by private capital has been but a fraction of its former proportions since 1930. When war was declared the dearth of new supplies which might have been available had search been more active, made it necessary for the government itself to take over the functions of the prospector. Provided with large skilled personnel and adequate capital, the U. S. Bureau of Mines and U. S. Geological Survey have established a record upon which the relative effectiveness of government vs. private exploration may ultimately be judged.

Extensions of Reserves by Technical Progress

From time to time reserves have been increased in large amounts through technical progress.

In the early history of gold mining in California, the cost of mining was high; rock drilling was done by hand. This limited operations to relatively high-grade ore. There followed various mechanical developments, the rock drill driven by compressed air, electric motors operating with electric power brought in over transmission lines, the internal combustion engine and other improvements too numerous and too well known to need detailed mention. The effect of these developments was to reduce

the cost of breaking ore and bringing it to the surface. As pointed out elsewhere, these advantages were largely used, not merely to increase profits on a limited quantity of relatively rich ore, but rather to extend operations to lower grade ores, thereby increasing the tonnage of reserves. The larger operations which resulted employed more men, brought about larger communities with better living conditions, better schools, hospitals and better protection of public health.

Reserves have been similarly extended by technical improvements in ore treatment. In the early period, gold, for example, was largely saved by amalgamation, with a relatively low percentage of recovery of the metal in the ore. Then followed concentrating devices, the Frue vanner, tables and the cyanide process. Still later came froth flotation. Thus, better extraction also extended ore reserves by adding to the recoverable value. The cost of treatment was at the same time lowered by these and other mechanical developments. Air drills in mining have had a profound effect in contributing to ore reserves and the use of cyanide and flotation, since their adoption, has possibly been responsible for a greater enlargement of metallic ore reserves in the United States than has new discovery. In the non-metallic field, research in developing new uses has also played an important part in creation of mineral reserves.

Relation of Production Cost to Reserves

In a period when cost trends are upward as at present, there is inevitably a serious shrikage of *economic* mineral reserves. And as the reserves become uneconomic, the opportunity of employment in the mineral extractive industries shrinks proportionately. In the past the trend of basic costs has been upward, but the cost of production of minerals has been able to run contra to that trend because of technological progress. However, there is no visible evidence that technical development can continue to match increasing basic costs. One can hardly contend that there will not be further scientific progress in the mining and treatment of minerals, but until such development becomes established it cannot be relied upon to offset mounting costs.

Conclusions

Mineral reserves of wide variety and of substantial size are available in California not only to maintain an active mineral industry indefinitely, but with proper utilization to provide the raw materials for a large expansion in manufacturing operations.

EMPLOYMENT IN CALIFORNIA MINERAL INDUSTRIES

(Other than petroleum and natural gas)

By S. R. COGHLAN [1]

Employment, Prewar and in 1943

The war has brought about marked changes in the employment pattern of the mining industry in California. These changes had their beginnings before Pearl Harbor. The output of quicksilver and tungsten in the late '30's had been stimulated by higher prices induced by armament demands. But the most significant changes within the industry started about the middle of 1941, when labor shortages and wartime restrictions curtailed the output of gold, until in 1943 it reached the lowest amount and value since gold was discovered in California in 1848. However, all other branches of the industry responded with increased output to the abnormal wartime demands for other mineral substances and products derived from them, but the additional labor thus employed did not balance the great drop in gold mining employment.

For the purposes of this survey, it is a fortunate coincidence that the 16th U. S. Census was taken in March, 1940, just before any appreciable changes from normal operations had occurred and figures of employment in the text and the tables which follow are either taken from Census statistics or are calculated from them, using the employment indexes of the California Division of Labor Statistics.

The distribution of the mining labor force in 1940 and 1943 includes owners, technical, office and sales personnel and is presented in Table 1. The influence wrought by the severe curtailment of gold mining in this period is shown also. Percentages of changes are included in the table.

Included in Table 1 are all persons employed by companies whose production is reported yearly in the California Division of Mines statistics. The Division's classification does not coincide with that of the U. S. Census, for several industries, classified by the Census as manufacturing, are considered by the Division as being producers of mineral products. Examples include cement mills, producers of structural clay products, borax,, magnesia, etc. Because of this difference in statistical bases, figures of employment of the Census vary widely in non-metallic mining from those of Table 1.

TABLE 1

Classification of Mining Workers of California, 1940 and 1943

Group	1940	1943	Percent Increase+ Decrease—
Total employed in the mining industry	32,628	20,450	—37.3
Metal mining:			
Total employed in all metal mining	16,850	4,250	—74.8
Gold mining only	13,700	800	—94.3
Other metals	3,150	3,450	+9.5
Non-metallic mining:			
Total employed in non-metallic mining	15,778	16,200	+2.7

[1] Metallurgical Engineer.

Table 2 presents a breakdown of totals in Table 1 and shows industries included, base data, their sources and computed figures for 1943 employment.

TABLE 2

Details of Employment in the Mining Industry, 1940 and 1943

Industry	Employed 1940	Source	1943 average employment index	Employed 1943
Total mining	32,628	a	e	20,450
Metals	16,850	a	25.2	4,250
Non-metallics	15,778			16,200
Non-metallic mining and quarrying	4,413	a	110.0	4,852
Cement mills	1,288	b	154.4	1,989
Structural clay products	3,242	a	75.3	2,441
Clay pottery and related products	2,681	a	103.1	2,764
Saline group	3,045	c		3,045
Cut stone and related products	609	a		609
Rock crushing and sand washing	500	d		500

[a] 1940 census. [b] U. S. Bur. Mines. [c] Same as 1943 number reported by producers. [d] Estimated from returns from companies. [e] California Division of Labor Statistics.

Employment in Allied Industries

In addition to the labor force shown in Table 1, there were over 18,000 (1943) employed in industries directly dependent on the mineral output of California. These are industries which use raw materials of low place-value and could not operate economically on raw materials transported any considerable distance from the source.

Examples include the production of glass and glassware, some heavy chemicals, lime, concrete and its products, and the production of pig iron and steel at Fontana, the raw materials for which are chiefly California ores. Other steel producers in the State are not included as their principal raw materials are scrap iron and pig iron made in other parts of the country.

Although it is expected that there will be changes in the number employed in the individual allied industries, the total of 18,000 should not decrease in the postwar period if construction is active in the State.

A large but undetermined number are employed in necessary service industries such as manufacturers of mining machinery, foundries, repair shops, automotive service, transportation of raw materials and others of a similar nature.

War Period (1944)

Changes are constantly occurring in the employment pattern. The curtailment of gold mining caused a decrease of almost 13,000 in the number of employed persons with no large increase in other metals or non-metallics to counteract it. Apparently other sections of the mining industry have passed their war-time peaks of employment and are either now or will be at lower levels in the near future. The quicksilver industry employed an average of 1,285 men in 1942 when the price was $185 per flask. In the latter half of 1944 the price in California had dropped

to $98. Most of the small properties closed down and only 450 persons were reported to be working in October, 1944. High-grade chromite and manganese ores became available from abroad in larger quantities than in the early war years. This situation resulted in lack of demand for such low-grade materials from domestic sources and a revision of purchase specifications by Metals Reserve Company and a large majority of the operators report that they cannot meet the new specifications and they either have shut down or will do so before the end of 1944.

Cement companies state that their operations have been decreasing since 1942 until now the average output of all companies in the State is about 60 percent of that year. This was caused by smaller demands for government projects than in 1943 when construction of army and navy installations and the Shasta Dam was at its maximum.

Exhaustion of some base metal deposits has closed down several operations and increasing scarcity of labor, especially unskilled, has reduced the output of others. No marked increase of employment is foreseen for the base metal industry in the near future for it is the opinion of authorities that while there are potentially important sources of base metals in the State, they are essentially high-cost operations. The same authorities believe they are unlikely to be developed unless it is possible to provide an assured price for copper of 15¢ per pound and 8¢ for lead and zinc over a period of several years. Unless some plan is advanced to this end the base-metal mines of the State are unlikely to provide any substantial postwar employment.

Postwar Outlook

While there will be a reduction of employment in such industries as chromite, manganese and the base metals, reemployment in gold operations and greater activity in non-metallic industry is expected to bring about an actual increase of from 6000 to 7000, or 29 to 34 percent, over the 1943 employment figure of 20,450.

During the course of this survey, field engineers of the California Division of Mines, consulted executives of most of the mining companies in the State. From the data furnished and a comparison with 1943 statistics, estimates were computed of future employment.

Excluding gold mining, which will be treated separately, companies employing 19,375 persons in 1943 estimated that their postwar labor force would approximate 19,400; practically no change from the 1943 total. A breakdown by industries is presented in Table 4.

Reporting data for this total were companies who anticipate large increases in their labor forces, others producing the same material who expect decreases; many who foresee no change and some in the metal industry other than gold who look forward to cancellation of premiums and report that their properties will be closed down. These data are summarized in Table 5.

Postwar Outlook for Gold Mining

During 1940 there were 13,700 persons employed in gold mining, only 800 in 1943 with many of the latter acting as pump men, general maintenance workers or watchmen. U. S. Bureau of Mines statistics

for 1940 show 1,866 gold mines producing, of which 1,030 were lode mines and 836 placer properties. These do not include itinerant prospectors, "snipers," and others who gave no evidence of legal right to property. During 1943, the number of mines producing had dropped to 221, many working only a part of the year.

The problem of forecasting postwar employment in this field is a difficult one. Many small companies have gone out of business and others including some of the large producers of the past, state that resumption of operations will depend on the postwar economic situation bringing about either a lower wage scale than at present or a higher price for gold.

A partial canvass of the field has resulted in data from 13 of the large lode producers of the past four years and also from 21 smaller operations, all of whom expect to employ 10 or more workers. All of these state that production will either be increased or resumed just as soon as labor, equipment and supplies are available. The number of prospective employees of these lode mines amounts to 3,400 and is listed in Table 3 as Minimum Expectancy.

Postwar employment estimates reported by the above lode mining companies were more optimistic than anticipated. In view of the rising tendency of wage levels and the uncertainty of an increase in the price of gold, there is some question as to whether all forecasts in this field are justified.

In placer mining, the largest employers of labor are companies operating connected-bucket dredges. In these operations the percentage of labor costs to total costs is much smaller than in lode mining, therefore wage rates are not so important. In the years preceding the war there were some 1800 persons employed in connected-bucket dredging but operating companies predict a lower degree of activity and estimate that their postwar employment will be about a total of 1600 persons.

Dragline dredges and non-float washing plants employed 1500 persons in 1940. Since then much of the equipment was either sold to the government or moved from placer properties and used in construction activities. Engineers of the California Division of Mines believe that difficulty in obtaining new equipment and the higher wage scale, as compared to pre-war, will limit employment in this section of the industry to 500 persons in the immediate postwar years.

Besides connected-bucket dredges, dragline dredges and non-float washing plants, there were 487 miscellaneous placer operations in 1940. Employment in these, together with prospectors and snipers, totaled about 2000 in 1940. It is conservatively estimated that at least 900 will be engaged in these miscellaneous operations after the war and this figure is used in the tabulation of Minimum Expectancy. This, added to the estimates of employment in dredging operations and non-float washing plants, gives a total of 3000 as the minimum number expected to be employed in placer operations. Combined lode and placer mining should employ not less than 6400 persons.

It is probable, however, that the above total of minimum expectancy, 6400, will be considerably increased. It must be considered that the numerous small lode mines, taken in the aggregate, were, in pre-war years, as important as potential employers of labor as the comparatively few large operations.

It is believed that two-thirds of the 1000 smaller lode mines producing in 1940 will resume operations and will employ 3400 men, or an average of 5 each. This total is added to the number of prospective employees reported as Minimum Expectancy for lode mines, and the sum of the two, 6800, is termed Maximum Expectancy, in Table 3.

For each 5 producing lode mines of the pre-war years, it is estimated that there was one non-producing mine or exploration project employing an average of 5 men. It is believed that after the war this ratio will be repeated and that 140 to 150 of such enterprises will probably employ 700 men.

In addition to the total of 10,500 who may be employed in established operations, there have always been a large number of prospectors and small operators who do not regularly report their activities to statistical agencies. The total of these amounted to several thousand during the depression years and may well be 1000 in years of average activity.

TABLE 3

Employment in Gold Mining—1940 and Estimated Post-War Period

Group	1940	Post-war expectancy	
		Minimum	Maximum
All gold mines	13,700	6,400	11,500
All lode mines	8,400	3,400	7,500
Producing mines	----------	3,400	6,800
Exploration	----------	----------	700
Placer mines	5,300	3,000	4,000
Bucketline dredges	1,800	1,600	1,600
Dragline dredges and non-float washing plants	1,500	500	500
All other placer operations, prospectors, snipers, etc.	2,000	900	1,900

From the foregoing it may be predicted that gold mining may employ about 11,500 persons provided there is a suitable adjustment of wage rates which may vary with the economic capacity of individual mines and with the price of gold. Such adjustment may come about after war-time restrictions are lifted, labor is available and properties now idle are dewatered and put into working condition. An increase in the price of gold or a reduction in operating costs would almost certainly be reflected in opening of marginal properties and stimulating prospecting and operation of new properties, all of which would increase employment beyond the estimates used herein.

Because of the wide range in value of gold ores, operations may be increased more or less directly in proportion to any decrease in cost of production. Wage rates are the only element of cost which has risen substantially, having increased 50 percent or more above pre-war levels. It is evident therefore that the extent of gold mining employment depends largely upon labor's willingness to work at rates the gold industry can pay. So long as the mines are idle because rates are held at levels too high to permit operation, these idle mines may be regarded as a reservoir of potential employment.

Unemployment cannot be regarded as serious under these circumstances.

Postwar Employment in Production of Mineral Substances Other than Gold

Totals presented in Table 5 of postwar employment in the production of metals other than gold and of non-metallic mineral substances are based on data supplied by operating companies and their estimates of future employment.

A breakdown follows in Table 4 of data for each material or in some cases groups of materials in the same general classification. In chapters on individual substances additional information will be found about present and postwar employment.

TABLE 4

Number of Persons Employed in Producing Minerals Other Than Gold

Substance	Number employed	
	1943	Estimated post-war
Barite	100	100
Carbon dioxide	100	100
Cement	2,800	2,500
Crushed rock, sand and gravel	3,300	3,300
Chromite	300	c
Clay and clay products	4,300	6,125
Copper, lead and zinc	800	400
Dolomite	100	50
Granite and building stone	50	100
Gypsum	350	500
Iron ore	100	100
Lime and limestone	300	400
Magnesite and other magnesium compounds	500	500
Manganese ore	200	c
Mineral water	100	100
Pumice and pumiceous material	100	100
Quicksilver	1,000	450
Salt	500	500
Other salines [a]	2,100	2,100
Silica	150	100
Soapstone and talc	200	250
Tungsten ore	825	725
Miscellaneous [b]	1,700	1,600
Totals	19,975	20,100

[a] Includes borates, calcium chloride, soda compounds, potash, bromine and iodine.
[b] Includes asbestos, bentonite, bituminous rock, diatomite, feldspar, mineral paint, pyrite, semi-precious stones and crystals, sillimanite, slate, strontium, titanium, cut stone and related products.
[c] Undetermined.

The estimates for postwar employment take into account the effects on employment of mechanization adopted during the war.

Postwar Outlook for all California Mining

Data of estimated minimum and maximum employment for the entire mining industry in first years of the postwar period from foregoing paragraphs and tables are presented in Table 5. Data for 1940 from Table 1 are also shown as these were considered to be typical of a pre-war normal year.

TABLE 5

Estimated Employment in 1940, and Post-War Years

Group	1940	Post-war	
		Minimum expectancy	Maximum expectancy
Total employed in the mining industry	32,628	26,500	31,600[a]
Metal mining:			
Total employed in all metal mining	16,850	8,100	13,200
Gold mining only	13,700	6,400	11,500
Other metals	3,150	1,700[b]	1,700[b]
Non-metal mining:			
Total employed in non-metallic mining and processing	15,778	18,400	18,400

(a) Postwar employment in mining activities and related processing, other than gold, has been assumed the same for both minimum and maximum expectancy because of lack of data indicating otherwise.
(b) Data obtained from producers of metals other than gold indicate a postwar employment about 46% below that of April 1940.

Population Dependent Upon the Mining Industry in California

The U. S. Census of 1940 shows that in April, 1940, the number of residents of California was 6,907,000. The U. S. Census of 1940 also shows that in the same month the employed labor force of the State totaled 2,525,000.

From the above it is calculated that the average dependency factor for the State as a whole was 2.735 in April 1940, which means there were on an average, nearly two and three-quarters persons dependent on each wage earner, which, of course, includes the wage earner himself. The direct dependent population of the mining industry has never been established in California but there is no reason to believe it will vary to any appreciable degree from the average of all activities of the State. The factor of 2.735 is used for computing dependency upon the mining industry. The resultant direct dependent population for this group was in April, 1940, therefore, 32,628 as shown in Table 1, times 2.735, or 89,238.

In addition to these, there are the 18,000 previously reported as being employed in industries which utilize mining products in their processes. The dependency of this 18,000 would amount to 49,230.

The sum of 89,238 and 49,230 or 138,468 represents the population of California directly depending upon the products of the mining industry for a livelihood.

Only one comparative study of this character is known to have been made, that of Rolland A Vandegrift and Associates, entitled, "The Economic Dependence of the Population of Utah," which was based on the 1930 census. It is interesting to note that the direct dependency factor for the mining industry to that State is shown as 3.552 whereas the average for all industries in California in 1940 was only 2.735.

"The incident of high industrial activity and employment in California war industries had, by June 1943, developed some changes which, while probably temporary, are worthy of note. A population increase of 1,193,000 persons, giving a total of 8,100,000, was estimated by the

State Reconstruction and Reemployment Commission, and employment for June 1943 was reported at 3,464,000 persons by the State Division of Labor Statistics. The dependency rate, under war conditions, was therefore apparently reduced to 2.338. This involved, of course, the employment of an unusual number of women.''

Indirect Dependency Upon the Mining Industry

The economic activities of the State may be divided into two groups: the primary industries and the service industries. The first group may be considered to include mining, agriculture, manufacturing, forestry, fishing, motion picture production, off-shore shipping and activities dependent upon tourist trade. All other economic activities are service in character and are dependent for their existence upon the primary industries of the State.

It is apparent, therefore, that in addition to the number of persons directly dependent upon the primary industries, there are a large number of service employees, together with their families, indirectly dependent upon the primary industries.

The problem of segregating population indirectly dependent upon any one primary industry, as, for example, mining, offers many complications and so many assumptions would be used that results would be open to question. The economic structure of California is as complex as can be found anywhere and here, to a greater extent than in most states, the primary industries are, to a considerable degree, interdependent as each industry or its employees uses products of the others to an undetermined extent.

Charts from a recent survey of the United States as a whole, published in Time in September, 1944, showed that the population indirectly dependent upon the primary industries through services rendered to the industries and to their direct dependent populations, totaled about 50 percent of the population of the country. It is believed that this percentage may be higher in California, but it is safe to assume that double the number directly dependent upon mining owe their economic existence to this industry through both direct and indirect or service employment.

One outstanding example of the dependence of manufacturing upon mining may be cited. Mining machinery and equipment made in California are in universal use. Dredges, filters, pumps, crushers, dust control systems and the products of many other manfacturers of specialized equipment are operating in mining districts all over the United States and in many foreign countries. Several companies, which started in business to produce mining machinery have found that equipment originally intended for mining and ore-dressing is suitable for many other purposes and their markets have enlarged accordingly.

In 1939, mining enterprises of the State purchased machinery and equipment valued at $38,000,000 [1] much of which was for the production of petroleum and natural gas. Equipment for gold mines alone totaled $3,550,000 and in the same year purchase of supplies and material for gold mining operations amounted to $7,405,000.

[1] Rounded figures from 16th U. S. Census statistics.

TABLE 6

Average Weekly and Hourly Earnings and Average Hours Worked per Week

Industry group	Average weekly earnings					Average hourly earnings[1]					Average hours per week				
	1940	1941	1942	1943	Oct. 1944	1940	1941	1942	1943	Oct. 1944	1940	1941	1942	1943	Oct. 1944
Metal mining	$33 05	$34 18	$40 39	$49 93	$54 99	$.758	$.758	$.877	$1.043	$1.153	46.0	45.2	46.0	47.8	47.7
Non-metallic mining	29 40	32 98	42 23	49 34	55 98	.703	.790	.936	1.052	1.181	41.8	41.7	45.0	46.9	47.4
Cement	33 69	36 58	44 31	49 89	55 92	.840	.893	1.019	1.091	1.140	40.1	40.9	43.5	45.7	49.1
Manufacturing: Durable goods	$30 71	$37 53	$48 47	$54 60	$60 76	$.781	$.891	$1.079	$1.198	$1.304	39.3	42.1	44.9	45.6	46.6

NOTE: Statistics for wage earners, salaried employees excluded.
[1] Includes overtime pay and premium wages for night-shift work.

Postwar demands for new machinery should be favorable. Many producers are on record as stating their intentions to erect new plants and to replace existing equipment.

The mining industry in California is in a key position to be the nucleus of a large number of new industries in the State. Research and development will demonstrate the economic feasibility of processing mineral products for nearby markets either to a greater extent than at present or by new enterprises in the chemical and manufacturing fields.

Wage Rates, Earnings and Work Hours

An analysis of income received by average wage earners in the mining groups and also those in the durable goods group of manufacturing has been made to show changes brought about by wartime conditions and also to compare earnings received by the miner with those of the factory worker. (Of the total wage earners in durable goods manufacturing, 67 per cent were engaged in aircraft plants and shipbuilding in October, 1944.)

Attention is directed to the fact that the figures in the tables which follow refer to wage earners only. Clerical, executive, supervisory, professional and technical employees are excluded.

Earnings and Hours Worked—1940 to October, 1944

Table 6 shows average weekly earnings, average hourly earnings and average hours per week of wage earners (salaried employees excluded) in metal mining, non-metallic mining and cement mills for the years 1940 to 1943 and also October, 1944. For purposes of comparison similar statistics for all manufacturing industries producing durable goods are included.

The data were compiled from California Division of Labor Statistics publications.

TABLE 7

Average Weekly and Hourly Earnings and Average Hours Worked per Week

Indexes of October, 1944. 1940=100

Industry group	Average weekly earnings—Index No.	Average hourly earnings—Index No.	Average hours per week—Index No.
Metal mining	166	161	104
Non-metallic mining	190	168	113
Cement	166	136	122
Manufacturing:			
Durable goods	198	167	119

Table 7 presents index numbers for the data of October, 1944, from Table 6, and should be compared with similar statistics of 1940 which are considered to equal 100.

It is significant that while average weekly earnings of the metal miner increased $21.94, or 66 percent from 1940 to October, 1944, earnings of the durable goods industry worker increased $30.05, or 98 percent. And although the average miner worked 1.1 hours more per week, his weekly "take-home" pay was $5.77 less than that of the worker in the durable goods industry. The wartime shortage of manpower especially common labor, in mines and mills may be attributed to this difference.

TABLE 8

Average Hourly Earnings—Year 1940 and October, 1944, Based on 40-Hour Week

Industry group	1940	October, 1944	Percent increase
Metal mining	$.674	$1.067	58
Non-metallic mining	.689	1.095	59
Cement	.819	1.042	27
Manufacturing:			
Durable goods	.781	1.218	56

Table 8 presents statistics of average hourly wages of all wage earners in 1940 and October, 1944. These were determined by adjusting data of Table 6 for overtime. Data on premiums paid for night shift work were not available but the small difference of such an adjustment would be negligible.

LEGISLATIVE AND OTHER CONTROL IN MINERAL INDUSTRY

To the extent that mineral production in the United States is subject to influence or control by legislation, the economics of the industry becomes essentially a political quantity.

Increasing numbers of laws and regulations directly or indirectly affecting the mineral industries have been adopted in recent years. These relate to the following:

Federal and State taxes
Withdrawal of mineral lands from entry
Federal and State leasing Acts
Anti-trust laws
Tariff acts
Foreign trade treaties
Gold and silver purchase Acts
Anti-debris and stream pollution measures

To this must be added the ever-increasing volume of legislation relating to all business activity. During wartime, additional controls are imposed which may either stimulate, retard or stop mineral production altogether. Of the latter, Priorities Order L-208 is an example of the extraordinary powers of government agencies in wartime to completely arrest activity in a given industry. Controls of this character include also the regulations imposed by other agencies on the use of power, fuel, and restrictions relating to employment of labor.

These are, of course, wartime restrictions and controls which are expected to be repealed as soon as the emergency for which they were adopted has passed.

Effect of Legislative Controls

Most legislative enactments, both Federal and State, regardless of the wisdom or necessity of their adoption, have had the effect of retarding production and increasing the cost of mineral products. Tariff Acts, the extension of Reconstruction Finance Company's loans to mining, purchases of mineral products by government agencies and laws governing gold and silver prices are examples of exceptions to this statement.

To the list of laws retarding or preventing new development and production must be added Federal and State Securities Acts. The cost and time required for registration and the difficulty of meeting restrictions imposed on the sale of securities has almost eliminated prospect development by small groups. Only larger companies who do not need to go to the public for capital, are able to carry on any substantial amount of exploration under present conditions.

Another influence which has retarded the use of venture capital in mineral development is the recurrent threat of adverse legislation. Examples of this kind include proposals to eliminate depletion allowances, the recurrent proposal to impose severance taxes and the failure of legislative bodies and government agencies to recognize the problems peculiar to the mineral industries.

Land Withdrawals

Over 55 percent of the total area of western states is said to have been withdrawn from entry by the Federal Government and there appears to be a tendency to extend this further. For the most part this has put an end to search for new mineral deposits in the area involved.

During the war, additional areas amounting to thousands of square miles have been set aside for bombing ranges and other military purposes, mining being permitted only in a few cases and then usually only on a very restricted basis.

Most of the withdrawals, however, have been made in the guise of National Parks or National Monuments, with restricted areas extending far beyond any need for preservation of natural features.

If the mineral resources in these areas are not to be opened for private exploration, then it becomes important that government agencies should undertake this work.

NEEDED CHANGES IN CALIFORNIA STATUTORY AND ADMINISTRATIVE LAW

By Robert M. Searls [a]

A careful survey has been made of the needs of the California Mining Industry for changes in statutory and administrative legal provisions in order to facilitate its rehabilitation after the war. Conferences were had with the operators and attorneys for various branches of the industry. As pointed out elsewhere in this report, the gold mining industry in particular is in a precarious condition because of the statutory price for its product for which no increase is immediately predicted and the heavy increase in costs which it must meet after V-Day in necessary rehabilitation, retimbering, and unwatering of workings and general increase in labor and material costs. There seem to be a few legislative and administrative steps which could be taken that would materially ease this burden and facilitate the resumption of this important California industry. The following suggestions are made to that end:

(1) PERCENTAGE DEPLETION: Section 117-c of the Federal Income Tax Act for the year 1944 specifically defines "gross income from the property" on which this deduction is calculated so as to insure a market value at the mine of the first marketable product produced being taken as the basis for the computation. The California Corporation Income Tax Law contains no definition of "gross income from the property." In general the State Franchise Tax Commissioner has followed the rulings of the Federal Commissioner in such matters. It would be helpful if the industry could have assurance that such would be the practice with respect to State of California corporate income tax returns.

(2) SALES AND USE TAXES: Due in part to the requisitions which have been made by war authorities and in part to deterioration of machinery through disuse, it will undoubtedly be necessary for the mining industry to purchase and install substantial amounts of new machinery and equipment. The State sales tax and use tax on these purchases will be a substantial burden. If there could be a temporary release of such taxes on machinery and equipment required for the purpose of rehabilitating our gold mines, say for a period of two years following V-Day, it is believed that this measure would be quite helpful and would not be a heavy burden on the State measured in terms of loss of revenue. It is therefore suggested that the Legislature enact a temporary relief clause with respect to such machinery and equipment, exempting it from both sales and use tax for a definite period of time.

(3) STREAM POLLUTION: One branch of the gold mining industry is concerned with hydraulic mining. In aid of this branch the Federal Government has constructed across the Yuba and American Rivers two large size tailing dams designed to prevent the flow of mine tailings into the valley regions and to store them so that these mines can operate without detriment to the valley country. Section 481 of the Fish and Game Code contains a rigid provision prohibiting the deposit in any waters of this State of any substance or material deleterious to fish, plant

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life, or bird-life. It is physically impossible for the hydraulic mines, not to mention some of the drag-line and dredge operations, to operate in strict compliance with this provision of the law, and it would seem desirable to provide an exception in favor of the miner where the streams in which his tailings have been deposited have been protected by adequate dams from carrying the sediments below the storage barriers, even though during some seasons of the year it may be necessary for the miners to deposit material in such protected streams in order to operate. An amendment to Section 481 is suggested for this purpose.

(4) UNEMPLOYMENT INSURANCE: The California Employment Commission has evinced entire unwillingness to follow the present practice of the Commissioner of Internal Revenue in exempting the income of mine leasers from payment of unemployment insurance taxes, and insists that they should be treated as employees. A case is now pending in the courts involving this important question, but it would seem that the best way to insure uniformity of Federal and State procedure would be to amend Section 7 of the Unemployment Insurance Act by adding after Subdivision (a) in the list of exempted occupations an enumeration of lessees of mineral deposits, both surface and subsurface. The mining industry considers such an exemption either by statute or by administrative ruling accepting the Federal rule to be important. There are large areas of gold bearing land, both above and below the surface, in the mining country which could be profitably mined by leasers if they should be assigned the territory under independent contracts which they can handle as they see fit, paying the owners of the property a royalty. In the past this has given employment to a substantial number of men in each of the various mining camps. If, however, the owners are compelled to treat these leasers as employees and assume all the expense of employer responsibilities to them, the leaser system will become impracticable. There seems to be no good reason why skilled mine workers should not be given an opportunity to make an independent stake for themselves through such mine leases, even if the capital they invest is merely their manual skill and practical knowledge of the best methods of prospecting for, developing, and following gold bearing veins.

(5) WORKMEN'S COMPENSATION: For many years in California it was assumed by the gold mine operators that if they could show a clean bill of health so far as silicotic dust hazard is concerned and full compliance with the regulations and standards of the Industrial Accident Commission prescribing maximum dust content for the air in mines as measured by standard methods, then the mere fact that some man who once worked for them later in life developed silicosis (sometimes called miner's consumption), would not be evidence that he contracted it in mines which had complied with such standards. However, in recent years the Industrial Accident Commission has taken the position that the mere fact that a man has silicosis raises a presumption that he acquired it or had it exacerbated in every mine in which he ever worked. As the hazard carries a permanent total disability compensation, this ruling (which has been affirmed by the Supreme Court in several cases) threatens to enormously increase the cost of compensation insurance in gold mines. There seems to be

no good reason why a mine owner who has conscientiously followed regulations and kept his mine clear of dust should have to pay for industrial hazards in other mines (probably outside the State) where such careful precautions have not been taken. The present ruling discourages expensive precautions to eliminate dust hazard because the operator faces total disability payments anyway if any man who works for him contracts silicosis. Furthermore, it has been held by the Supreme Court that the statute of limitations does not run on a silicosis disability claim until the claimant discovers that he has the disease, thus the hazard becomes one which may extend for a lifetime and seriously affect compensation rates for that reason. It is suggested that Section 5400 of the Labor Code be amended so as to place a reasonable statute of limitation on such occupational disease claims, to start running from the time that a man leaves an employment which might involve silicotic hazard. It is further suggested that Section 5307 (f) of the Labor Code be amended by adding a proviso that the mere fact that a compensation applicant is found to be suffering from an occupational disease shall not be considered as presumptive evidence of the fact that he incurred such disease in an employment where such disease hazards might exist, unless the applicant proves also that the disease hazard did in fact exist in such employment.

The foregoing constitute practical suggestions for aid to the rehabilitation of California's mining industry, which are commended to the careful consideration of the Legislature and administrative tribunals affected thereby.

NEEDED CHANGES IN FEDERAL STATUTORY AND ADMINISTRATIVE LAW

On August 10th and 11th, 1944, official delegates from eleven Western States and South Dakota met in San Francisco at the invitation of Governor Warren of California and Governor Carville of Nevada, and adopted a number of resolutions recommending certain changes in the existing laws and regulations affecting the mining industry.

The resolutions make recommendations with reference to the production and marketing of gold, monetary policy, stockpiling, marginal mines, tariff, freight rates, mine finance, access roads, labor laws, taxation, public land policy, Federal and State bureaus, availability to the States of government records pertaining to mining and disposal of basic defense plants.

While there must inevitably exist some differences in views on such subjects as monetary policy, the provision of a free market for gold, and the wisdom of fostering the development and operation of marginal mines, the resolutions are reprinted herein in full as they represent the considered opinions of those officially delegated to present the views of the mining industry in California.

It is suggested, however, that this statement might advisedly be amended to call for the allowance of depletion on *all* minerals as the basic premise, that minerals are "wasting assets," is true in all mineral deposits.

RECOMMENDATIONS OF CONFERENCE OF DELEGATES OF ELEVEN WESTERN STATES AND SOUTH DAKOTA

August 10-11th, 1944

Pursuant to the invitation issued by Governors Warren of California and Carville of Nevada, official delegates of eleven western States and South Dakota met in San Francisco August 10th and 11th, 1944, to ascertain whether any changes in the existing laws and regulations affecting mining should be made, and whether any new laws were necessary in order to enable the mining industry to do its full part in the reconversion of the Nation from war to peace, and in making available the maximum economic employment of men in the mining industry.

Delegates representing California were as follows:

Phillip R. Bradley, Jr., Chairman, Lode Gold Mine Operators
William C. Browning, Lode Gold Mine Operators
George W. Hallock, Hydraulic Mine Operators
William W. Mein, Jr., Cement Industry
F. C. Van Deinse, Dredge Operators

All delegates are members of the State Mining Board.

As a result of these deliberations the following recommendations were adopted:

The Production and Marketing of Gold

War Production Board Order L-208

In the opinion of this Conference, War Production Board Order L-208, singling out gold mining as the sole American industry to be closed down during the war by Government order, never was justified. Incontrovertible facts showing such lack of justification were available to and should have been known by the War Production Board at the time the order was promulgated. The order never accomplished its stated purpose of diverting man-power and materials into strategic metal mines. The needs of postwar employment require that jobs be available in the gold mines and dredging operations so soon as the man-power shortage ceases. In order to enable mine operators to prepare for resumption of operations, Order L-208 should be rescinded *now*, and, pending the effective date of such rescission, the War Production Board should adopt a liberal policy of permitting individual mines to produce enough gold bullion to return their maintenance costs.

Gold Mining Not a Non-essential Industry

The practice of constantly referring to the gold mining industry as a "non-essential industry" which for some time has been and still is currently emphasized in bulletins, press-releases, directives, and regulations issued by the War Production Board, War Manpower Commission, and Office of Price Administration, casts an unjust reflection on an industry which furnishes the sole important source of peace-time employment and major source of local business in over 19 counties in California, practically all the counties of Nevada, Idaho, and Colorado and important parts of Oregon, Washington, Utah, Arizona, Montana, South Dakota, New Mexico and Wyoming. Without desiring to detract or draw from man-power or materials actually used or useful in the war effort, we demand that these government agencies cease this unjust discrimination against our industry as compared with other peace-time industries who serve no more useful purposes in war time, and accord us our fair share of labor certifications and material priorities necessary to permit operation under existing limitations of Order L-208.

Foreign Markets for Gold

It is currently reported that the free market price for gold in India, North Africa, and Asia Minor has fluctuated between $40 and $80 per ounce, and that mines in the British Dominions are enjoying that price for their product; and this meeting of mining representatives from the Western mining States believes that restoration of the ability of American gold mines to produce gold at the earliest moment consistent with war man-power demands, is essential to the preservation of the local economies of the districts in which they are located, to postwar employment opportunities for miners and prospectors, to the maintenance of an adequate national currency backing of gold, and to the stabilization of international money exchanges on a basis that will permit of the free resumption of international trade after the war. We believe that the

President and through him, the Secretary of State of the United States should be memorialized to take such steps and enter into such negotiations as will make free markets for gold in foreign countries available to American gold producers, and will remove current legal restrictions on the export of newly mined gold to such markets by American producers.

Monetary Policy

We advocate the use of gold and silver in the International Fund and also in the International Bank, proposed at the Bretton Woods Conference of 44 nations or in any other International Monetary Program. We believe that the American people are in favor of a sound monetary system, safeguarding their interests against paper inflation. Printing press currency is not desired by the average American, nor does he want the currency of the United States debased by any international group of "experts."

Experience of the world with greenbacks after the Civil War, and with worthless German marks after World War I, was disastrous and caused a lack of confidence in any "managed currency" plan.

Stockpiling

It is imperative to the continuation of the mining and smelting industry and postwar employment of the maximum number of employees possible, that (1) all government owned stockpiles of strategic or critical metals and minerals and all government owned or controlled non-ferrous scrap metal shall be frozen at the termination of European hostilities, and that (2) all reverse lend lease and preclusive purchases of metals and minerals should be added to such frozen stockpiles, as failure to do so means the stagnation of the mining industry of the United States.

These reserves of critical or strategic metals and minerals should be kept inviolate for future war emergencies and must not be released except by Act of Congress.

Premium Prices and Marginal Mines

The higher prices for newly mined metal and also the additional premium payments should be continued until such time as operators can recover their capital investment, especially those stimulated to produce for the war effort. But in no event should these higher than normal prices and premiums be in effect longer than one year after cessation of hostilities, and the present expiration of the premium price plan should be extended to July 31, 1946.

Premium metal prices were established by the Government as a productive incentive. They are not, and should not be construed to be revenue of the mining companies in the computation of state taxes.

Tariff

We oppose any reduction of tariffs on metals or minerals either directly or indirectly as such action would result in decreased mining activity and consequent drastic reduction of employment in the western states.

The imposition of moderate tariffs or slight increases in certain instances would provide materially increased activity and employment.

Any suggestion that the United States can not develop supplies of strategic metals and minerals under satisfactory incentive conditions should be rejected. A healthy industry is required to assure the nation of a sufficient supply of metals during another emergency. Any tariff reductions which would destroy any part of the mining industry would make the future supply of minerals in a national emergency most hazardous.

Freight Rates

We recommend: (1) That the existing statutes authorizing the railroads, in the first instance, to initiate and establish freight rates, subject to the supervision of and regulation by the Interstate Commerce Commission and the various State Rate Regulating Authorities be maintained in lieu of the provision appearing in any of the bills now pending before Congress that are opposed thereto. (2) That the railroads and rate regulating authorities are urged to recognize and adopt a procedure of rate-making that will have the effect of encouraging the development of manufacturing and industrial expansion in the western States.

Mine Finance

We recommend that a Central Publicity Committee be established and financed pro rata by the 12 Western States here represented to nationally publicize the importance to the nation, of the mining industry of the West in: (1) providing employment, (2) providing national security, and (3) encouraging investment in mining by the public.

We recommend to our Governors that they call a conference between mine operators, underwriters of securities, and members and representatives of the Securities and Exchange Commission to determine measures necessary for modification of the S. E. C. regulations and to facilitate financing of mining enterprises by sale of securities to the public.

We recommend that Reconstruction Finance Corporation make immediate loans for the purpose of rehabilitation of mines closed under Order L-208 and to provide funds for the current upkeep and protection of the owner's equity.

Access Roads

We endorse the present Public Roads Bill now before Congress as to the provision for mine to market roads in postwar years.

Labor Laws—Limitation on Back Pay Orders

In the opinion of this Conference undue hardship has been imposed upon the mining industry through retroactive back-pay orders of the National Labor Relations Board, the Federal Wage-hour Administrator, and the War Labor Board. The interests of labor will be adequately protected if a limitation of six months from dates of orders be placed by law upon the right of these tribunals to impose retroactive back-pay orders. Mine operators will be protected by such limitation against confiscatory administrative orders which the courts have generally refused to modify, even when violations of the labor laws may have been found which were unintentional, or made in good faith reliance upon a

construction of the statutes or regulations at variance with subsequent administrative interpretation.

Taxation

Drastic alteration in the Federal tax laws and their administration is essential to the development of new mines and to the maintenance of production and employment in existing mines at a satisfactory level.

Prompt revision of the Federal income tax laws must follow the conclusion of hostilities. Otherwise, a speedy and orderly return to a productive and stable peacetime economy based upon American principles of free enterprise will be impossible. The necessity for large revenues will continue after the war and the mining industry recognizes its obligation to bear its fair share of the necessary costs of servicing the national debt and of efficient and economical administration of the government. These costs can be met and the Federal budget balanced only if taxes are imposed for the sole purpose of providing revenue and are levied in such a manner as to preserve individual incentive and encourage the investment of risk capital in the production of new wealth and the expansion of employment. Only in this way can the American standard of living be maintained and improved and national solvency be assured.

The excess profits tax must be quickly repealed upon the termination of the war. This tax penalizes efficiency, deadens incentive, and imposes an arbitrary ceiling upon the rewards of productive effort which, if continued into peace time, will do mortal injury to our system of free private enterprise.

Other corporate taxes should be reduced as much as fiscal necessities will permit and so simplified as to eliminate the burden of multiple returns and reports. The capital stock tax and related declared-value excess profits tax should be repealed. The crushing discrimination against business corporations worked by existing tax laws must be removed. The present unjust double taxation of corporate earnings should be ameliorated by some system of credits or by the partial exemption of corporate dividends, in order that shareholders of corporations, whether large or small may be permitted to receive a fair share of corporate profits.

The taxation of capital gains at high rates and arbitrary limitations on the deduction of capital losses effectively discourage the investment of risk capital in new enterprises. This is especially true in mining enterprises in which the hazards of loss are great. A ceiling rate of not more than 15 per cent should be provided in the case of long term capital gains and arbitrary limitations upon capital losses should be removed.

Adequate allowances for depletion are essential to the preservation of a sound and dynamic mining industry. Such allowances, including percentage depletion, should be preserved in any revision of the tax laws. The administrative simplicity of the percentage method of depletion is seriously threatened by hypertechnical administrative interpretations and procedures, the apparent tendency and purpose of which is the reduction of the depletion base. Wherever necessary, clarifying legislation, such as the recent amendment defining gross income from the property, should be enacted to nullify arbitrary bureaucratic action in derogation of legislative policy and intent.

Section 122 of the Internal Revenue Code, relating to the net operating loss, should be amended so as to eliminate certain limitations which work serious and invidious discrimination against the natural resources industries.

The present opportunistic administrative policy of retroactive revision of rates of depreciation is unfair and disturbing to the fiscal stability of industry and should be revised.

The present policies and procedures of the Bureau of Internal Revenue in the administration of claims for relief under Section 722 of the Internal Revenue Code are antagonistic to the spirit and purposes of this equitable provision and should be drastically modified. Elaborate instructions which have been given to field agents to guide them in the processing of these claims should be published and thereby be made to run the gauntlet of free criticism.

All internal revenue directives and instructions to field agents as to policies to be followed in disposing of taxpayers' cases should be made public.

Public Land Policy

This Conference strongly disapproves the reported policy of the General Land Office in initiating proceedings to have mining locations held void for lack of discovery, where they are made on the unreserved public domain by locators who believe in good faith that they contain valuable metals in mineable quantities and have been prevented by war temporarily or other conditions from perfecting their discoveries. The Taylor Grazing Act should be amended to prohibit the initiation of such contests by the General Land Office for the benefit of grazing land lessees, and the latter should be relegated to the courts for protection if they believe their rights have been infringed by mineral locators.

We condemn without reservation the arbitrary and illegal withdrawal by executive order of vast areas of the public domain from universal entry, by various divisions of the Department of the Interior. Such action prohibits the development of new mines and destroys all possibility of increased employment in the industry. We oppose the provisions of U. S. Senate Bill 736 and any other bill introduced or that may be introduced containing similar provisions or objectives.

Federal and State Bureaus

To avoid continuance of the duplication in mining investigations between Government bureaus and agencies, and with State bureaus, we recommend that the fields of the older Government bureaus be sharply delineated and the overlapping work of the other agencies be curtailed. We specifically recommend that for work of proper Federal character the United States Geological Survey be given supervision and charge of the geological and mineral investigations and the United States Bureau of Mines of mining proper, including statistical and mine-safety work and mine-operating problems, also beneficiation and metallurgical investigations.

Considering the present National debt and in contrast the present large accumulation of postwar funds in State treasuries, we suggest that the Governors of the States be urged to make recommendations for larger appropriations for geological and mining work within their States by their own bureaus, or in certain States where successful cooperative programs with the U. S. Government are being conducted, a continuation or enlargement of those programs.

We commend collaboration between Federal and State bureaus for the purpose of utilizing the special functions and qualifications of each party, and making an exchange of information in order to avoid duplication of effort. However, we deplore the proposed plan to have the United States Bureau of Mines establish in each State an office and staff that would duplicate if not usurp the field of State bureaus.

Availability to the States of Government Records Pertaining to Mining

Since valuable geological and engineering reports of great importance to each State have been made by the various Federal bureaus and agencies on prospects and mines in our States, which are now considered confidential, we urge a Congressional Act that will make available to each State all geological and mining data collected by the Federal Government in the State during the war period due to expenditure of Government funds, but not to include confidential information furnished by operating companies.

Disposal of Basic Defense Plants

We favor an orderly transition from Government ownership to private ownership and operation for all present Government-owned "war plants," but only on a sound economic basis; and that this process or changeover be done in such a way and at such a time as not to interfere with national security.

We urge that before a plant is shut down or its production curtailed prior to ultimate sale or disposal, due consideration should be given, insofar as possible, to the overall economics of such change; that such change be made, when possible, only after a thorough-going survey by competent disinterested, nonsectional, nonpolitical engineers and specialists.

We favor outright sales of such war plants to private industry whenever they can be made in harmony with public welfare. Plants and equipment of potential postwar value which may be found to be unsalable in the immediate postwar period, except at sacrifice prices, should be leased for private operation until economic conditions governing their ultimate actual value can be determined. Leases should be made with the objective of putting the facilities into useful operation and as a means of testing the market for the product. Leasing policies may also be employed to keep in working condition those plants which may be needed in future military programs.

Fully appreciating the comprehensive scope of the recommendations of the delegates, this report with all of its recommendations is respectfully submitted to the Governors of the eleven Western States and South Dakota, in the hope that they will find in it a definition of the policy which will fill the needs of the mining industry, which will enable it to most effectively contribute to postwar conversion and rehabilitation of industry, and which will meet with the approval and support of the Western Governors' Conference in all steps necessary to carry it into effect.

Respectfully submitted,

PHILIP R. BRADLEY, JR.,
Chairman of the Conference

WILLIAM W. MEIN, JR.
JAY A. CARPENTER
Secretaries

POSSIBLE EXPANSION OF CALIFORNIA MINERAL INDUSTRIES

The probable postwar course of various individual mineral industries has been reviewed elsewhere in this report. In some cases specific suggestions which might bring about expansions have been made. The expansion of the mineral industry in California must be predicated upon the ability of producers to supply present markets or to develop new outlets.

This involves the opening of new sources to supply deficient markets, reduction of costs to reach into more distant markets, improvement in quality to compete with products of lower grade and the development of new uses;—usually the result of research.

All of these measures have been employed in the mineral industry in California with marked success. The production of potash at Searles Lake was only possible after the most painstaking exhaustive research, and research continues to be a notable element in this operation. It has made possible not only the successful extraction of potash from the brines, but other products such as soda ash and salt cake. More recently bromine and lithium have been added and it is now announced that minute traces of tungsten present in the original brine will be recovered as soon as equipment for that purpose can be obtained.

Extension of markets by research for new uses is notable in the case of diatomite. The large deposits at Lompoc were known for many years before any serious attempt was made to utilize them. Up to 1901 only scattered shipments had been made; a total of less than 150 tons. Research was undertaken around 1900 and the industry responded by growth which still continues. Average annual production of this material for 1941-42-43, coming largely from the Lompoc deposits and those in Los Angeles County, amounted to 141,915 tons of a value of $2,230,683. Growth of similar character in talc, andalusite, magnesia, volcanic ash, bentonite and other minerals has followed research in markets, improvement of products and exploration of new deposits.

Belief is held in some quarters that there is little opportunity for expansion in California metal industries. It is probably true that except under stimulation of high prices maintained over considerable time is there likely to be any substantial increase in copper, lead or zinc activities. Some other metals, however, have a somewhat more optimistic outlook. If the Fontana blast furnace is to continue operation after the war, iron ore production in California will be on a scale much greater than prewar years. Tungsten offers development possibilities both in existing mines and the probability of finding new deposits. Research of the U. S. Bureau of Mines near Redding on the utilization of pure metals—chromium and manganese—may, if successful, be applied to domestic ores. Aluminum and magnesium, produced in California for the first time during the war, will be reappraised to determine postwar possibilities. The future of gold and silver mining is obscure. Given the stimulus of a further increase in price, operations could be substantially expanded.

The greatest promise for expansion in the mineral industries lies in the field of non-metallics suitable for chemical and other industrial manufactures. There are known deposits of great magnitude of the following minerals of this class:

Borates	Potash
Clay	Pumice
Diatomite	Salt
Dolomite	Salt Cake
Gypsum	Silica
Kyanite	Soda
Magnesia	Limestone
	Talc

There are also substantial reserves of:

Andalusite	Carbon Dioxide Gas
Barite	Feldspar
Bentonite	Garnet
Calcium Chloride	Strontium
	Steatite

Materials of these two groups and some others which may be capable of development, constitute an important backlog of industrial development. The mere step of mining these minerals is but a minor part in their ultimate industrial career, and their importance in the State's economy cannot be measured in any such simple way. A ton of borax "ore," for example, after leaving the mine, is treated chemically, providing employment to plant operators, chemists, electricians, mechanics and many other skilled and unskilled men. Power and fuel are consumed, calling for distant employment in those fields. Truck drivers and railroad men are required for transportation. Finally the finished product is packaged in boxes or other containers bearing familiar labels. They pass through various channels of distribution and become a part of the work of the grocer and his deliverymen. Thus a long series of men and women find employment treating and handling mineral materials long after they have been mined and shipped.

The most important field for expansion of California mineral industries is in the field of chemical manufacture. The probabilities in this direction are discussed in this report by Herbert Waterman [1] under the title of "The Chemical Industry as Consumer of California Minerals."

There has already been substantial development in this direction but so far this accounts for but a small degree of the possible utilization of California minerals in the chemical field. The slow growth which has characterized this business is due in part to the nature of its beginning. In most cases it has not been undertaken as the result of coordinated search either by a manufacturer needing the best possible raw materials or a mine owner seeking the best possible markets, but often to the more or less incidental circumstances which brought the two together. Much of these minerals have been sold through dealers and brokers who, while performing a useful service to the miner, often providing financial assistance, nevertheless intervene between producer and consumer, preventing a free exchange of information as to the needs of the manufac-

(1) Herbert Waterman, Ph. D., Consulting Chemical Engineer, Los Angeles.

turer and the possibility for the miner to select or treat the output to produce a more acceptable product. Secrecy as to the source of material has sometimes characterized these transactions with its obvious disadvantage for both miners and manufacturers.

The development of the California chemical industry with mineral materials as its basis requires a comprehensive survey of mineral reserves, their size and quality, their position with reference to markets, transportation, power, fuel, labor and the possibility of economies by interrelated effort.

A program to this end is recommended by Dr. Waterman.

Reports of mineral deposits heretofore published by the Division of Mines, as well as the U.S. Bureau of Mines, are generally inadequate for this purpose. They lack exact detail, as to average analyses, accurate tonnage estimates, possible operating costs, market information, and other economic information required if any definite plan of procedure is to be undertaken.

For some years the U.S. Bureau of Mines has issued publications with specific economic information usually covering various single mining operations. Reports by the California Division of Mines have not often been of this character. To this extent the recommendation herein, to be effective, must depart from conventional lines. This procedure, when originally adopted by the U.S. Bureau of Mines, brought out some protest that the government was usurping the functions of consulting and other privately employed engineers. Many of those who registered this protest have since found the Bureau of Mines publications of inestimable value in their own work and have considered it fortunate that early protests were ineffective. The author confesses to being one of these.

It is therefore without reservation that the project proposed by Dr. Waterman is endorsed, and the Legislature is urged to appropriate adequate funds for this purpose.

Detailed estimates of the cost of such a project cannot be made within the limited time available, but is believed that not less than $100,000 would be required for this undertaking.

Division of Mines Activities

The function of the State Division of Mines in the past has been largely technical, historical and statistical, with some supplemental activities such as the determination of minerals, maintenance of a mineral collection, and licensing of gold transactions. It is believed that the welfare of mineral industries in the State would have much to gain if the Division's activities were extended to include continual economic studies. In view of the large number and the diversity in character of the State's mineral deposits, and the fact that little has yet been done in this direction, there would need to be some expansion of staff for this purpose. Economic studies should include not only the gathering of data on the size, character, analyses, operating costs, transportation, power, water supply, fuel and all other points of economic importance, but should also embody a continuous study of markets, specifications, prices, trade practices and competition.

When private industry has failed to find satisfactory economic methods of beneficiating low-grade or complex ores or mineral materials, the Division of Mines should be equipped to carry on necessary research.

For this purpose it is recommended that there should be coordination of effort and cooperation with such universities in the State as are equipped with suitable research facilities.

Projects such as the treatment of masses of tactite which occur in large quantities in California should be given consideration. Some of these bodies carry tungsten, beryllium, tin, garnet and other minerals. Cases are known in which no single mineral is present in quantities sufficient to sustain production for that mineral alone, but which might be treated by a combination of chemical and ore-dressing methods to yield a commercial result by recovering two or more minerals.

Similar opportunities may exist in regions containing pegmatite—a rock mass often containing not only quartz and feldspar, but various other minerals such as mica, tourmaline, beryl and occasionally rare metals.

Mapping

Topographic and geologic maps of adequate scale, accuracy, and quality are fundamental to the development of the mineral industry. Such maps are vitally necessary in planning, investigating, exploring, constructing, and operating. A program of mapping designed particularly to lay the groundwork for an efficient and useful mineral industry should therefore be given full support by both Federal and State post-war planning agencies.

Status of Mapping in California

On the accompanying sheet (folded in the pocket of this bulletin) are two maps of California. On the back of this sheet is a discussion of the present "Status of Topographic and Geologic Mapping in California." One map is an index to geologic maps and to all the published topographic quadrangles. The other shows the distribution of all known economic mineral deposits—prospects, mines, quarries, oil and gas fields, and sedimentary areas explorable for oil and gas. In comparing these two maps, it is evident that most of the highly mineralized sections of the State lack adequate maps. At least one-half of the State should be remapped topographically and on a scale suitable for use as a base for geologic mapping. The rest of the State is covered by maps, most of which should be revised and kept up-to-date.

Topographic Mapping Procedure

Throughout the United States, the U. S. Geological Survey (Department of the Interior) has always been the principal mapping agency responsible for preparing topographic quadrangles. For the most part, this work has been financed by means of a cooperative arrangement between State and Federal agencies; the State's Legislature's appropriation is matched dollar for dollar by Congress.

In California, since its program for topographic mapping has lagged on account of insufficient appropriations, other mapping agencies, in particular the U. S. Forest Service and the U. S. Army have undertaken work in this field. The maps produced by these other agencies, however, generally are not as well suited to use in geologic mapping as the quadrangles of the U. S. Geological Survey. The latter agency has developed an unexcelled technique; it maintains a well-trained personnel; it is provided with proper equipment for preparing maps of the highest quality.

Geologic Mapping Procedure

The procedure in geologic mapping is entirely different from topographic surveying. The geologist uses these topographic maps in tracing the boundaries of the rock units, in plotting rock structures and mineral deposits, and in measuring the thickness and shapes of geologic bodies.

There is no one special geological mapping agency. The work is not as mechanical nor does it require the same uniformity in procedure as topography. Geological mapping requires a study of the rocks themselves, their composition, the sequence in which they are formed, their history, as well as where their boundaries should be drawn on the already-prepared topographic map. In many States, the State Geological Survey does detailed field mapping, but in California the State Division of Mines does not maintain an adequate sized staff to do much of this work. Geologic mapping is done by the U. S. Geological Survey, with or without cooperation with the State geologic agency. Geological departments of some of the universities are engaged in mapping geology, in some instances in cooperation with the Geologic Branch of the State Division of Mines.

Program of Topographic Mapping

It is recommended, in a program of topographic mapping, that the following features should be considered:

(1) That an annual appropriation be made by the State Legislature for this work to be matched dollar-for-dollar by the United States Congress.

(2) That the mapping agency should be the U. S. Geological Survey.

(3) That priority should be given to areas known to be important to industry.

(4) That the original scale of map drawings should be sufficiently large for detailed field geologic mapping.

(5) That a uniform scale (preferably 1:62,500) for published quadrangles should be maintained even though larger scales may also be employed for special problems.

(6) That the program for topographic mapping and maintaining maps to keep them up-to-date be speeded up during the next five years in order to cover the most important areas first; but that the whole program by necessity be extended over a long period, making it virtually continuous.

(7) That with such a program about 225 men could be annually employed.

Program of Geologic Mapping

It is understood that a program of topographical mapping is now being considered, and therefore, it is recommended that a program of geologic mapping be coordinated therewith. This should be done by cooperative arrangement between the Geologic Branch of the California Division of Mines and the U. S. Geological Survey.

THE CHEMICAL INDUSTRY AS CONSUMER OF CALIFORNIA MINERALS

By Herbert Waterman [1]

The chemical industry is an important consumer of minerals. Its demands are fairly constant, and are seldom subject to violent fluctuations, common to many other mineral users. In California, the industry uses over one-third of all the non-metallic minerals (other than fuels) produced within the State.

In 1939 over one-half of the output of the chemical industry of California was shipped out of the State for use elsewhere. Borates, potash, iodine, bromine, lithium and magnesium compounds and numerous other products are in that category. The remainder of the chemical production of California is used within the State, and is made up, for the most part, of low-priced heavy chemicals which cannot be shipped far due to heavy transportation charges. It is estimated that in 1939 the value of chemicals brought into California from other localities about equaled that of the chemicals shipped out of the State.

While no figures are available on the production of chemicals within the State in recent years, it is estimated that between two and three fold expansion of the industry took place within California between 1939 and 1944, brought about largely by the demands of the war economy and by the expansion of other chemical consuming industries. The expansion was largely in the production of heavy chemicals. In some cases, the minerals required are shipped in from other localities, as, for example, sulphur. In other instances, the expansion resulted in greater utilization of local minerals, such as salines and others.

The total number of employees in California in 1944 engaged in the manufacture of chemicals and allied products such as drugs, paints, salt, explosives, soap, fertilizer and similar products, is estimated to be about 25,700, of which about 7,500 are engaged in the manufacture of heavy and fine chemicals. Corresponding figures for 1939 were 15,300 employed in chemicals and allied products and 4,300 in the manufacture of heavy and fine chemicals.

After the war, the manufacture of heavy chemicals in California is likely to be curtailed in the same proportion that activities of consuming industries will decrease after returning to peacetime operations. On the other hand, it seems likely that in the field of fine chemicals, the amount produced will not be materially altered by the termination of hostilities.

The development of the chemical industry in California is far from complete. It is likely that the proportion of the total chemical production within the State shipped out to other localities was not altered materially in 1944, as compared with 1939. The major part of the total chemical consumption within California is manufactured elsewhere and brought into the State. This lack of development of the industry limits the use of many local minerals and ores. Many of these minerals and

[1] Consulting Chemical Engineer, Los Angeles.

ores, not used, or used to a very limited extent could be utilized if suitable chemical plants were built, making chemicals at present brought in from other localities.

Cheap and abundant fuel, alkali, limestone and many other minerals offer a very attractive background for many chemical manufacturing operations. The steady increase in the general industrialization of the State will be unquestionably accompanied by a corresponding increase in the local demand for all kinds of chemicals, most of which could be advantageously manufactured locally.

In many cases the utilization of minerals in chemical manufacture in California has been limited to the simpler and more obvious operations. Mineral deposits of complex character, requiring much research, have not been fully utilized. In other cases new or increased output of minerals should result from the integrated planning of new chemical industries.

The development of an integrated plan must involve consideration of the manufacture of a large number of chemical products and the possible utilization of hundreds of deposits of different mineral substances located in various parts of the State. Since there are many deposits of the same mineral in different regions, the decision as to which should be selected involves not only questions of size and grade of material, but all other economic questions including power, fuel, transportation, labor and marketing problems.

The interest of private enterprise usually is of limited scope, being confined frequently to a single product. Since the adequate development of a chemical industry requires the consideration of a large number of different chemical products and the possible use of 30 or more mineral substances, an investigation of these possibilities appears to be too broad to be undertaken by other than a government agency.

It is recommended that the State of California authorize a detailed study of its mineral industry from the point of view of the suitability of the dormant mineral deposits for the manufacture of chemicals in California and elsewhere.

This study should cover the whole State, and have for its ultimate objective definite recommendations concerning specific mineral deposits, indicating in what manner they may be used in the manufacture of specific chemicals. Such a study would include an extensive investigation of the mineral deposits of the State, and should be directed to those minerals most likely to be used as the raw materials for the manufacture of chemicals. The location, character and the extent of these deposits should be determined and questions relating to available transportation, its required extension, problems of power and fuel, and all other related subjects connected with these deposits should be carefully examined.

Such a mineral investigation should be of a high order of technical treatment rather than the descriptive method employed in many of the reports of the State Division of Mines, so that its findings could be fully relied upon by private capital.

Simultaneously with this mineral investigation, a study of the economic and technical factors connected with the manufacture of specific chemicals starting with a given mineral deposit should be carried on. This study would determine the available or likely markets for the products, the past and probable future price history and its effect on the feasibility of the undertaking, the preferable location of manufacturing

facilities in view of the all important factors of raw materials location, probable markets and transportation costs, fuel, water, waste disposal, available labor and other factors.

Since chemical manufacturing is most efficient when it is fully integrated, any study of this character should investigate the problems of inter-relation of the chemical producing and consuming plants within the State. The abundance of a chemical product in a given locality frequently makes possible the manufacture of whole series of kindred or derived products, which could not be made singly. It is for this reason related chemical industries congregate in definite districts, as, for example, the electrochemical industry concentrated in Buffalo, while the general heavy and fine chemical industry is located in New Jersey. The State of California offers many possibilities of an analogous development.

Particularly important deposits of minerals have been held for years in weak hands without sufficient capital and working knowledge of how to determine their economic possibilities. Many of the present mineral enterprises have been characterized by slow growth from feeble beginning, insufficient knowledge of markets and techniques, and lack of adequate capital, all of which brought about wasteful failures, bankruptcies, and reorganizations. Improperly designed plants were built in poor locations.

The maximum usefulness of mineral deposits can only be obtained by a State-wide determination of which of them is best suited for economic production for a given purpose.

Industrial study would remove the chief obstacle to the development of the mineral deposits of California, since it would provide comprehensive knowledge of the extent, quality, uses, markets, methods of preparation and manufacture, and economics of production of mineral products for conversion into chemicals. However, the existence of other obstacles should be recognized. It is difficult to obtain capital for new enterprises. While this is due in part to inadequate information as a basis for risking capital—and the recommended study would remedy this to a large extent—it is also due to the present tax structure which fails to recognize properly the risk factor in a new venture, as well as to the restrictions imposed by the State and Federal Securities commissions.

The Chemical Use of Industrial Minerals, Metals and Ores in the United States

In order to appraise the possibility of extending the chemical consumption of minerals in California, a study was made of the proportion of the mineral production of the United States, consumed or processed by the chemical industry. The results of that study, based on the year 1941, are shown in Table 1. While the percentages of the total output of a given mineral used by the chemical industry vary from year to year, the whole picture does not change substantially.

Table 1 gives the amount and not the value of the minerals used by the chemical industry. The grade and unit value of industrial minerals used by the chemical industry varies widely, and the percentage of the total tonnage used bears no relation to the total value.

For example, in 1941 the American chemical industry used 7,605,060 tons of limestone with a value of $5,068,987 out of a total of 12,303,830 tons valued at $13,788,732, or 62.6 percent of the total tonnage for 36.8 percent of the total value. In other words, while the chemical industry valued its limestone at about 67 cents per ton, the rest of the

TABLE 1

The Use of Industrial Minerals and Metals by the American Chemical Industry in 1941[a]

PART 1

	Total	Tons	Chemical use, tons	Percent	Chemical uses
Metallic ores:					
Aluminum (bauxite)	1,721,475	L	295,348	17	Aluminum salts, such as alums, chloride, sulfate, etc.
Aluminum, primary	(1)		(1)	5	
Aluminum, secondary	106,362	Sh	935	0.9	
Antimony	29,994	Sh	11,590	38.7	Oxide and other salts
Bismuth	(1)		(1)	60	Medicinals
Cadmium	3,883	Sh	663	17	Pigments and chemicals
Copper, primary	1,605,000	Sh	21,668	1.3	Copper sulfate and chemicals
Copper, secondary	726,396	Sh	9,804	1.3	
Lead	812,970	Sh	330,000	40.6	White and red lead, chemicals, insecticides
Magnesium metal	10,976	Sh	205	1.4	Pyrotechnics and chemicals
Mercury, flasks	(44,800)		(32,300)	72	Drugs, chemicals, pigments, fulminate, catalyst
Nickel, secondary	5,315	Sh	404	7.6	Salts
Palladium, ounces	(78,904)		(3,342)	4.2	Chemical ware and salts
Platinum, ounces	(190,075)		(68,285)	36	Chemical ware and salts, catalyst
Tin	134,695	L	2,460	1.8	Chemicals and tin oxide
Tungsten	(1)		(1)	5	Chemicals
Zinc, primary and ore	900,000	Sh	175,000	19.5	Zinc pigments and salts
Zinc, secondary	283,967	Sh	48,504	17.2	

[1] No data available.
L Long tons.
Sh Short tons.
% Chemical use either estimated or from Minerals Yearbook. U. S. Bur. Mines. 1941.
[a] Data derived from Minerals Yearbook. U. S. Bur. Mines. 1941.

PART 2

	Total	Tons	Chemical use, tons	Percent	Chemical uses
Non-metallic minerals:					
Arsenic, white	34,784	Sh	(1)	Over 80	Insecticides, medicinals
Barite	490,833	Sh	246,987	50.5	Lithopone and chemicals [2]
Borate	(1)		(1)	100	Processed chemically
Bromine	34,159	Sh	34,159	100	Chemicals
Calcium chloride	165,932	Sh	165,932	100	Processed chemically
Fluorspar	308,485	Sh	52,674	16.4	Acid [3]
Lime	6,079,416	Sh	3,561,203	[4]58.7	Industrial uses
Limestone	12,303,830	Sh	7,605,060	62.6	Alkali, carbide, magnesia paper and pulp, sugar, etc.
Magnesia brines, other than magnesia	137,357	Sh	137,357	100	Chemically processed
Phosphates	4,688,312	L	3,470,404	74	Phosphates and superphosphates
Salt	12,720,629	Sh	8,463,295	68.8	Chlorine, soda, dyes, etc.
Other sodium compounds (natural)	304,201	Sh	304,201	100	Carbonates and sulphates
Crushed and broken stone	181,160,980	Sh	7,605,060	4.2	Limestone largely
Sulfur, chemical industry		L	1,060,000	46	Industrial chemicals
Sulfur, process industry	2,238,000	L	1,179,000	54	Paper, etc.

[1] No data available.
L Long tons
Sh Short tons
% Chemical use either estimated or from Minerals Yearbook. U. S. Bur. Mines. 1941.
[2] 1935—67 6%; 1936—72.4%; 1937—61.4%; 1938—46.9%; 1939—51.5%.
[3] 1938—18.9%; 1939—15.0%.
[4] 1938—52.6%; 1939—52.2%.
California, 1939—69.8% in value, 70.2% in tonnage.

limestone consumed that year was valued at $1.86 per ton, or 2.8 times the unit value of the chemical limestone. On the other hand, the chemical grade of fluorspar was valued at $25.80 per ton, while the non-chemical grades were valued at $19.80, or in a ratio of 1.3 :1.

Minerals are the principal raw materials of the chemical industry and it is estimated that more than one-third of all non-metallic minerals producted in California, exclusive of fuels, are consumed or processed by the chemical industry.

In California, the value of salines, largely chemical products, form a significant part of the total value of non-metallic minerals and their products. Table 2 presents the importance of salines.

TABLE 2

The Importance of Salines in California *

	1939	1940	1941	1942	1943
Value, non-metallic minerals and their products	$49,174,788	$54,802,686	$72,368,709	$94,372,897	$81,371,204
Value, salines	$13,178,499	$13,674,519	$11,927,533	$15,645,003	$15,660,400
Value of salines as percentage of the value of non-metallic minerals	26.8%	25.2%	16.5%	16.6%	19.3%

* Based on figures from Bull. 126—Calif. Div. Mines.

The value of non-metallic minerals and their products, used in Table 2, includes the California Division of Mines classifications 'Structural Materials', 'Industrial Materials', and 'Salines'—that is, all of the mineral production of California, with the exception of fuels, metallic ores, or metals.

However, if the values of production placed on minerals by the U. S. Bureau of Mines were used in place of the values reported by the California Division of Mines, the value of saline production would be increased by almost two million dollars, there being almost one million dollars discrepancy in the value of salt alone.

Lime is an example of the increasing use of minerals in the chemical industry. Thirty years ago the process industries consumed an amount of lime equal to about one half of the tonnage of lime used by the building industry. By 1941 the chemical and industrial uses of lime were more than three times the amount used for building purposes. The California Division of Mines, Bulletin 126, 'California Mineral Producton and Directory of Mineral Producers for 1942', states (page 64) : ''The early output of lime in California was used entirely for structural purposes. Later a small percent was put out for chemical, agricultural, and industrial uses and still later lime replaced limestone in metallurgy. In 1942 the structural use had decreased to such a point and other uses increased to where they required the largest part of the lime burnt in this State, so it was decided to include lime with 'Industrial' limestone in this statistical report.''

Even in 1939, the building and the agricultural uses of lime were much smaller than the chemical and industrial uses, as shown by Table 3.

TABLE 3

Use of Lime in California in 1939[1]

Use	Tons	Percent total	Value	Percent total
Agricultural	1,311	1.3	$11,468	1.38
Building	24,776	28.4	273,458	32.8
Chemical and industrial	61,320	70.1	548,400	65.8

[1] Minerals Yearbook. U. S. Bur. Mines. 1939.

Chemical Manufacturing in California in Relation to the Industrial Economy

All the common chemicals, such as acids, alkalies, salts and organic chemicals, are classified together with other heavy and fine chemicals by the United States Bureau of the Census in the sub-group 'CHEMICALS NOT ELSEWHERE CLASSIFIED'. For convenience, this sub-group will be referred to hereafter by the simpler term 'chemicals'.

The State of California, the Los Angeles industrial area, the San Francisco-Oakland industrial area, and the "rest of California" as single units, are compared with regard to their production of chemicals and all industrial production, with twenty somewhat similar areas in the United States. These areas were selected on the basis that their production of chemicals exceeds that of any of the California areas. Complete statistical information is available for 1939 for all these localities in the 1939 Census of Manufactures.

The localities compared are:

1. State of California
2. Los Angeles Industrial area
3. San Francisco-Oakland area
4. The rest of the State
5. Buffalo area
6. Chicago area
7. Cincinnati area
8. Cleveland area
9. Illinois
10. Indiana
11. Louisiana
12. Maryland
13. Michigan
14. New Jersey
15. New York
16. New York-Newark-Jersey City area
17. Ohio
18. Pennsylvania
19. Philadelphia-Camden area
20. Pittsburgh area
21. St. Louis area
22. Tennessee
23. Virginia
24. West Virginia

Under each heading the rank of each California locality is given. The first rank means that the value of the index discussed is the highest of any of the twenty four localities listed, while the twenty fourth rank signifies the lowest value of the index.

Population and the Value of the Manufactured Products

California ranked fifth in population which, in 1940, was 5.25 percent of the population of continental United States. It ranked tenth in value of chemicals made (4.58% of the United States chemical production), and ninth in the value of all manufactures (4.92% of all United States manu-

factures). In manufacturing wage earners, it ranked ninth in chemicals (4.95% of all United States chemical wage earners) and tenth in all industry (3.50% of all United States industrial wage earners). All references to wage earners are to manufacturing wage earners only, and do not include salaried employees.

This suggests that the chemical production of the State and, to a lesser degree, all manufacturing lagged behind the expected development based on its population. Furthermore, it indicated that the chemical industry of the State was largely confined to low-priced heavy chemicals (4.58% of value produced by 4.95% of wage earners). However, for all industry the converse is true since 4.92 percent of value was produced by 3.50 percent of wage earners. This is largely due to the important role petroleum products play in the economy of the State.

A much more sensitive index of production is obtained by dividing the percent value by the percent population. California ranked nineteenth in this index for both chemical production and for all manufactures. It was 12.6% under United States average in chemicals and 6.2 percent under the United States average in all industry.

The Los Angeles industrial area contained 2.12 percent of United States population and ranked thirteenth. Its rank in chemical production was twenty-fourth, making only 1.17 percent of the United States chemical production. Its rank in industrial production was thirteenth, manufacturing 2.14 percent of United States manufactures in value. In the index ''percent value divided by percent population'' it ranked twenty-fourth in chemicals, being 44.8 percent under the United States average—very much under developed. For all industry it ranked eighteenth, producing about one percent over the United States average.

Los Angeles ranked twenty-fourth in chemical wage earners, employing 1.09 percent of United States chemical wage earners to produce 1.17 percent of value of all United States chemicals. In industrial wage earners it ranked seventeenth, employing 1.61 percent of all wage earners to produce 2.14 percent of value of all United States industries. It is significant that its industrial production appears largely confined to high-value products generally, though not in chemicals.

In contrast with Los Angeles, the San Francisco-Oakland industrial area is well developed. It ranked twentieth in population, 1.07 percent of United States, twentieth in chemical production (1.84% of United States chemicals) and eighteenth in all production (1.69% of United States). In chemical wage earners it ranked nineteenth (1.83%) and in all wage earners, its rank was twenty-first (0.97%). In percent value of products divided by percent population, it ranked tenth in chemicals (72% greater than United States average), and tenth in all manufactures (58% greater than United States average). This suggests that the production of chemicals in this area is very well developed, though confined largely to products requiring a high proportion of employees, while the production of all industries is in items requiring a small proportion of workers.

The remaining area of the State was midway between Los Angeles and San Francisco in its chemical development. In population it ranked fourteenth (2.06% of United States) in value of chemicals produced, it ranked twenty-second (1.57% of United States), in chemical wage

earners it ranked eighteenth (2.02% of United States). Here too, heavy chemicals of low unit-price requiring a large proportion of workers seem to predominate. In all industry, it ranked twenty-second in value (1.20% of United States), twenty-second in wage earners (0.92%). In the index ''percent value divided by percent population'' it ranked twenty-third in chemicals, producing 23.8 percent under United States average, and twenty-first in all products, 41.7 percent under.

TABLE 4

Chemical Production—Relative Rank, California and Other Areas

	Population	Percent U. S. population	Rank	Percent of U. S. value products		Value Chem. products as percent of all products	Percent value of products divided by percent population	
				Ind.	Chem.		All Ind.	Chem.
United States all manufacturing	131,669,275	100.00	--------	100.00	100.00	1.49	---------	---------
Los Angeles area	2,785,643	2.12	13	2.14	1.17	0.81	1.01	0.552
San Francisco-Oakland area	1,412,686	1.07	20	1.69	1.84	1.60	1.58	1.72
Rest of California	2,709,058	2.06	14	1.20	1.57	2.13	.583	0.762
California	6,907,387	5.25	5	4.92	4.58	1.38	.938	0.874
Buffalo area	958,487	0.74	23	1.59	9.05	8.40	1.88	10.69
Chicago area	4,825,527	3.68	8	7.53	3.15	0.62	2.05	0.856
Cincinnati area	907,293	0.69	24	1.24	1.75	2.10	1.80	2.54
Cleveland area	1,329,640	1.01	22	1.98	2.05	1.55	1.96	2.03
Illinois	7,897,241	6.00	4	8.44	4.68	0.36	1.43	0.78
Indiana	3,427,796	2.60	10	4.00	2.05	0.78	1.54	0.79
Louisiana	2,363,880	1.80	16	0.99	3.87	5.75	0.55	2.15
Maryland	1,821,244	1.38	19	1.81	1.45	1.22	1.31	1.05
Michigan	5,256,106	4.00	7	7.65	7.10	1.09	1.91	1.77
New Jersey	4,160,165	3.16	9	6.04	22.90	5.61	1.91	6.92
New York	13,479,142	10.23	1	12.58	14.58	1.72	1.22	1.42
New York, Newark, Jersey City area	10,782,353	8.19	2	12.23	12.70	1.54	1.34	1.60
Ohio	6,907,612	5.25	6	8.06	7.25	1.33	1.53	1.38
Pennsylvania	9,900,180	7.52	3	9.65	7.26	1.11	1.28	0.97
Philadelphia-Camden area	3,199,637	2.37	11	4.04	3.68	1.35	1.70	1.55
Pittsburgh area	2,082,556	1.58	17	2.64	2.71	1.52	1.67	1.72
St. Louis area	1,406,526	1.07	21	1.91	3.75	2.90	1.79	3.50
Tennessee	2,915,841	2.22	12	1.28	3.06	3.54	0.58	1.69
Virginia	2,677,773	2.03	15	1.74	4.00	3.39	0.87	1.97
West Virginia	1,901,974	1.44	18	0.78	6.80	13.00	0.54	4.73

Wholesale Chemical Trade in California

California, with a population of 5.25 percent of the United States population, purchases 6.55 percent of all manufactured products sold at wholesale in the United States, exclusive of farm implements and bulk petroleum. It will be recalled that it manufactures only 4.92 per cent of the value of all products made in the United States.

In chemicals, California buys 5.81 percent of the value of United States chemical production, at wholesale, while it produces only 4.58 percent of the United States chemical manufactures. The ratio of wholesale trade in chemicals to production within the State is 1.27 :1. For all manufactures this ratio is 1.33 :1.

About 28 million dollars of industrial chemicals were sold at wholesale in California in 1939, of which only about 8 million dollars was obtained from local sources, and about 20 million dollars were brought in from other localities. Low pool-car rates handled by carloading companies on west-bound freight make this movement possible. While this is an estimate, it is probably near enough the actual situation to make it significant.

The city of San Francisco appears to do the principal amount of wholesale trade in chemicals and in all commodities; 47.3 percent of California's wholesale trade was done in 1939 in San Francisco, and 42 percent of the trade in all commodities. It is the main trading center of California, though its population is only 9.16 percent of California's population, and 0.48 percent of that of the United States.

With about 21½ million dollars of California's chemical production of 38½ million dollars shipped out of the State, and about nine million dollars of chemicals sold directly by California's chemical manufacturers, the role played by the wholesale trade in shaping the pattern of chemical consumption and production in California is decisive. Of the estimated 1939 chemical consumption in California, the wholesale trade handles about 78 per cent. Of that amount the wholesale trade brings in from out of the State about 72 per cent and the remaining 28 per cent is of California origin. It is this situation which proves that there is need for greater chemical manufacturing within the State.

The Chemical Industry in California

No statistical information is available regarding the actual consumption of chemicals in California. It is possible, however, to estimate approximately the value of chemicals shipped out of the State. For example, the total production of borax, borates and boric acid in 1939 was valued at $7,373,953, of which $4,096,893 was exported to foreign countries. Most of the borate production of the United States originates in California, which consumed probably under $250,000. A large part of the bromine and iodine produced in the State, as well as their compounds, is shipped out. Magnesium salts, cream of tartar and tartaric acid, potash, soda ash, sodium sulfate, citrates, and organic compounds manufactured by the petroleum industry, are for the most part shipped out of the State for use elsewhere.

It is fully realized that the estimates of the value of these shipments are of necessity very approximate. Yet such estimates are of value in facilitating the complete understanding of the chemical industry in California.

Out of $38,500,000 worth of chemicals made in California in 1939, about $4,000,000 worth of organic compounds, and about $17,500,000 worth of inorganic compounds were either exported to foreign countries or were sold for consumption in other States. The total, $21,500,000, amounted to about 56 per cent of the State's chemical production.

There remains $17,000,000 worth of chemicals, or 44 per cent of the California chemical production, which was used within the State. It is estimated that about $9,000,000 of this total was sold directly by the chemical manufacturers in the State to other manufacturers of chemical and related products, and to petroleum refineries. About $8,000,000 was sold by the chemical wholesalers. In addition, they brought into the State $20,000,000 worth of chemicals to make up the total of $28,000,000 worth of industrial chemicals sold in California at wholesale.

It is impossible to estimate the value of chemicals brought into the State by chemical and other large manufacturers using chemicals which have not been handled by dealers.

Complete statistics are not available to show the growth of chemical manufacturing in California. The Federal Reserve Index shows a growth of 3.8 times between January, 1939 and May, 1944 for chemical production in the United States, and 2.35 times for industrial production. In California the growth of the chemical industry's output is likely to be at a lower rate than that for the United States. While the output of soda, magnesium compounds, bromine, iodine, organic chemicals, sulfuric acid and other heavy chemicals has increased considerably, the production of borates and potash declined somewhat. The most optimistic estimate would be that chemical production was tripled between the beginning of 1939 and the middle of 1944, though a fairer estimate would be that the value of chemicals produced in the State in 1944 was twice the value of 1939 production. The estimates thus vary between $75,000,000 and $120,000,000 for 1944 production, with $100,000,000 being probably the best estimate. In part this is confirmed by the labor statistics.

If, in the first postwar year, the chemical industry in California were to tend to return to 1939 output, it seems likely that the contraction of production in California would stabilize at about $50,000,000 as compared with $38,500,000 in 1939. The curtailment of chemical production is likely to take place largely in the heavy chemical fields, such as sulfuric acid. The output of heavy chemicals should stabilize at a point of local demand, the magnitude of which will be determined largely by the amount of industrialization which may be retained in the postwar period. On the other hand, the production of borates and of fine chemicals generally is likely either to expand somewhat or to retain the war gains.

The California chemical industry began as a producer of heavy industrial chemicals which can not be transported over long distances. A high order of self-sufficiency has been attained in this field. Further development followed in specialized fields based on the mineral resources of the State. Borates, magnesium compounds, iodine, potash, tartrates, citrates and organic chemicals derived from petroleum or natural gas are in this category. Cheap electric power and abundant resources of salt, fuel and lime created an electro-chemical industry, manufacturing chlorine and chlorinated compounds, caustic potash and other products. Future development will take place in the manufacture of more expensive organic and inorganic chemicals, and will increase the field of heavy chemical production as well.

One of the obstacles to this development is the absence of pooled-car rates on shipments of chemicals east from California. It is difficult in practice to take advantage of mixed car shipment because of the variation in class rate on very similar chemicals, combined with the rule that a mixed car takes the rate of the highest class shipped. Here lies an opportunity for the chemical industry to work together in an effort to bring about the establishment of these pooled-car rates, and thus to increase the market area for California's chemical production. This is important for fine chemicals especially, most of which are shipped in less than car-load quantities. Eastern manufacturers are able to ship these products west in less-than-car-load quantities through the carloading companies much more advantageously than the western manufacturers can ship east.

Among chemicals likely to be manufactured in California in the near future the following may be mentioned:

Chromates and chromic acid, copper salts (the production of which practically ceased in California during the war), lead and zinc salts and pigments, calcium carbide, magnesium compounds from magnesium-bearing materials, manganese chemicals, mercury compounds, titanium chemicals and pigments, methanol and formaldehyde, acetates, pharmaceuticals generally, silver salts, and some simple dyes and textile specialties.

POSTWAR CONSTRUCTION AND NEW EQUIPMENT PROJECTS

Wartime restrictions have prevented many companies from enlarging plant capacity and replacing obsolete or wornout equipment. Furthermore, construction of new plants for beneficiating minerals in excess of military requirements and for processing mineral products for civilian uses, has been temporarily suspended.

The backlog of such projects which have been accumulating represents a sizeable total and promises employment, not only for construction and installation, but for the producers of lumber, cement and other building materials and that required for manufacturing machinery and equipment. The total of employment will be further increased by corresponding workers required in the service industries.

New construction, plant additions and enlargements and modernization have been reported by 60 concerns as a part of postwar planning.

Gold Mining—Lode

Eight operators are planning to construct new mills ranging in size from 50 tons to 500 tons daily capacity. One reports that a new mill is now in process of erection and two state that mills will be erected if economic conditions are satisfactory. Two others plan to enlarge present facilities. In addition to new milling equipment for the above plants there should also be a corresponding substantial demand for mining equipment.

Gold Mining—Placer

One large operator plans to reconstruct a deep-digging connected-bucket dredge and another reports that a new dredge will be built. A third, that one more dredge may be added to enlarge present operations. An expenditure of $50,000 for equipment and supplies is planned by a fourth operator.

Demand for equipment for dragline dredges and non-float washing plants promises to be large. In 1940, these combined operations numbered 329. Since then a large part of their equipment has been either sold to the Government or has been rented for war work. In either case, replacements will be required for those properties which resume operation.

Cement

If cement demands come up to expectations, one large producer plans a sizeable expansion of present mill facilities.

Crushed Rock, Sand and Gravel

From information available it is evident that a majority of the large producers in the State have postwar plans involving new plants, enlarging present plants or installing new machinery. Extraordinary production demands, lack of spare parts and shortage of maintenance personnel have resulted in premature wearing out of machinery, hence a substantial replacement demand is indicated.

Brick

One company, which has been manufacturing refractory brick on a small scale, will complete the erection of a large plant, a part of which has already been built, as soon as machinery is available. Three building-brick plants will install new equipment with plant enlargement in one case.

Other Clay Products

Operators anticipate an estimated 50 per cent increase in production and, to provide facilities to supply this demand, extensive programs are planned. One concern reports that $100,000 will be spent in remodeling its plant, two will make plant enlargements and one will install a grinding plant and new loading equipment. New kilns will be erected by one of the largest producers.

Copper, Lead and Zinc

One company plans to erect a manufacturing plant to convert ores from its mine into finished products. Other projects of various operators include completion of a flotation mill, installation of new equipment and erection of a 50-ton mill.

Miscellaneous Postwar Plans

Two large new silica-sand preparation plants.

A new pumice grinding plant and the increasing of equipment in another.

One talc company plans extensive additions to present facilities in two locations including the erection of a new grinding plant. Another producer will double present mill capacity.

One large granite producer plans new buildings and new machinery and a second will install a new compressor.

A tungsten producer reports that mill capacity will be increased by 150 tons of ore per day.

NATIONAL MINERAL POLICY

At no previous time in history has there been so widespread and determined an effort to define a national policy with respect to minerals. The subject is a complex one and its consideration is clouded by differences in viewpoint. The economic interest of the miner is apt to be directly opposite to that of a manufacturer requiring mineral raw materials. Since the miner must seek the best prices he can for his output, his position with reference to tariff, disposal of war surpluses of minerals and metals and competing products resulting from trade treaties, is very definitely established; the manufacturer, on the other hand, may be expected to take an opposing view since it is his interest to obtain his raw materials at a low price.

Aside from differences of opinion inspired by economic considerations, there is a lack of agreement as to basic facts upon which a policy should be founded. This has resulted in much loose opinion and confused reasoning. A belief, fostered by some officials in high places, has gained widespread acceptance that the mineral resources of the United States are approaching exhaustion. This aspect is discussed insofar as it applies to California under the title of Mineral Reserves, *ante*.

An important official statement of view was made on November 10, 1944, by Philip D. Wilson. (1)

He stated in part: "This brings us to our national mineral policy of the future which should be given full and careful consideration now while we have so poignantly before us the inadequacies of our past policy. There is no gainsaying the obvious fact that this war will have skimmed the cream from our lead and zinc and even our copper resources. Premium prices have been necessary and they are playing a very essential part in assuring not only the cream but much of the very thin milk for our war requirements. After V-J Day our peacetime industrial economy built around the metals is going to make increasing inroads upon our dwindling domestic ore reserves.

"It has been estimated that after the war our domestic economy, including manufactures for export, may absorb annually 1,000,000 tons of copper, and 700,000 to 900,000 tons each of lead and zinc. Our unsubsidized domestic mine production today represents only $\frac{3}{4}$ of that amount of copper, 60% of the lead and only 40% of the zinc. Full wartime subsidized supply from domestic mines has not reached these figures except in the case of copper which was slightly more than 1,000,000 tons in 1942 and 1943. It seems most unlikely that the peak levels could be attained after the war without extremely high prices which would bring out very low-grade submarginal ores.

"To profit fully by a postwar era of full production and prosperity it seems inevitable that the country must resort to imports of metals to an extent that has never been necessary in the past. As regards zinc, we have increased the country's smelting and refining capacity for war needs, the increased capacity being largely dependent upon foreign concentrates. To keep these facilities operating at a rate to meet the indicated postwar need for slab zinc at moderate prices, continued imports of concentrates will be necessary to supplement domestic production. It is clear that our own mines can not furnish for long enough zinc or perhaps

(1) Vice Chairman for Metals and Mining, War Production Board.

even enough copper to keep our economy in high gear. Imports seem to be the only answer.

"Furthermore, we have constructed during this war an industrial plant capable of producing at least 50% more capital and consumer durable goods that ever before in our history. Our only hope of attaining Mr. Roosevelt's post-war objective of 60,000,000 jobs lies in virtually full operation of this plant. Its products cannot conceivably all be consumed within the United States. Greatly expanded export markets are necessary. Some economists are estimating that we should and probably will export after the war at least half as much again as our pre-war maximum. That would mean an annual export business of between 10 and 15 billion dollars, approximately the level of present exports. However, of the total of $14½ billions of exports in 1944, lend-lease will account for $11¾ billions. When lend-leasing ends how are we going to be paid for any such level of exports, which is going to be necessary to our continued prosperity and full employment? It has been suggested that we should accept in exchange raw materials of which we are now or anticipate that we may be in short supply, obtaining abroad increasing amounts of the major metals and petroleum, so that we may export finished products and to some degree conserve our own raw material reserves against future needs. Such a policy would mean drastic tariff changes and is an unpalatable dish to suggest to a group of miners. But is it not logical on both national prosperity and future defense grounds? The thought of the United States facing any future war as a have-not nation is even more unpalatable; it is terrifying__"

The U. S. Bureau of Mines and U. S. Geological Survey has prepared estimates of mineral reserves in California and an effort was made to obtain the release of these figures for the purpose of this report. Since the figures were under revision they were not made available. When published they should serve as one of the essential elements in determining a national mineral policy.

Other phases of the question include:

Need to increase foreign trade to sustain American economy.

The negotiation of further trade treaties for the purpose.

Maintenance or revision of mineral tariffs.

Conservation of mineral reserves as an industrial measure.

Conservation of mineral reserves as a military precaution.

Stockpiling minerals as a measure of industrial protection.

Stockpiling minerals as a measure of military policy.

Control of disposal of war surplus materials.

Policy on mineral sanctions.

Measures to make minerals available to all nations.

A consistent position as to mineral control and distribution by cartels.

Plans to stimulate search and development of new mineral deposits.

These are the broader aspects involved in the development of a National mineral policy. Inasmuch as this problem in California and other western States presents some special features, any National mineral plan proposed should be closely scrutinized to determine its effect on local industries.

Those California mineral industries which have adequate reserves should not be called upon to make disproportionate sacrifices for the benefit of regional industries elsewhere.

COMMERCIAL MINERALS OF CALIFORNIA

(In alphabetical order)

NOTE.—Under "References," the entries described as "Mineral Abstracts. California Division Mines, Unpublished," refer to compilations of data from the publications of the Division of Mines. Office copies of these compilations are available for convenience of research and consultation in the four offices of the Division at San Francisco, Los Angeles, Sacramento and Redding. For the following substances the "Abstracts" have been published in mimeographed form: Antimony, Iron, Pumice, Sulphur, Tungsten.

ALUMINUM

Aluminum metal has been produced during the war at Riverbank, Stanislaus County, and Torrance, Los Angeles County, in plants operated by the Aluminum Company of America on behalf of the Defense Plant Corporation. According to George C. Heikes,[1] the Riverbank (Stanislaus) plant cost approximately $12,000,000. Its designed capacity was 9 million pounds a month although only two of the three plant units (potlines) constructed were put into operation. The plant started to produce in May 1943 and ceased production in August 1944. It produced 29,848,000 pounds of aluminum in 1943 and 43,796,000 pounds in 1944.

The Los Angeles (Torrance) plant cost approximately $25,000,000. Its designed capacity was 15 million pounds a month. Only three of the five plant units were put into operation. The plant started production in July 1942 and ceased producing in August 1944. Production for 1942 amounted to 16,299,000 pounds; for 1943, 80,530,000 pounds; and for 1944, 72,651,000 pounds.

Neither plant was operated to capacity because of labor shortage.

The Aluminum Company of America also owns and operates a fabricating plant at Los Angeles employing about 4000 men.

Raw material for the production of aluminum metal is refined aluminum oxide derived from bauxite shipped from South America and purified at the company's plant at Mobile, Alabama. Much has been said and written during the war of the possibility of utilizing Californian and other Western clays as a source of aluminum. While it is physically possible to extract metallic aluminum from these clays it does not appear to be an economic operation so long as bauxite is available. The possibility of postwar operation is believed to be as follows:

1. There are no known deposits of bauxite in California in commercial quantity, consequently the only raw material occurring in the State is clays.

2. For economic reasons clays are unlikely to be used so long as bauxite or refined alumina from bauxite is available.

3. The plant at Riverbank, given a satisfactory power rate could be operated economically using alumina derived from bauxite from South America or Arkansas. However, agricultural interests in the vicinity of Riverbank have objected to operation of the plant because of damage to crops by fluorine-bearing fumes and dust. The power for this project comes from the Hetch Hetchy Dam.

The plant at Torrance might conceivably also be operated if a low enough power rate could be provided. Presumably neither one can operate at rates now prevailing.

The fabricating plant of the Aluminum Company of America located in the Los Angeles area, built prior to the war, is expected to continue operation in postwar time employing about 3000 men.

While utilization of aluminum raw materials produced in California is unlikely, a continuation of either the Torrance or Riverbank plants at capacity would provide important employment.

According to Arthur P. Hall,[2] the Aluminum Company of America

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[1] George C. Heikes, Director, Aluminum-Magnesium Division, War Production Board.

[2] Arthur P. Hall, Vice President, Aluminum Company of America. S. F. Chronicle. November 26, 1944.

has under consideration construction of a similar plant somewhere in the west.

Tariff Rates

Aluminum, aluminum scrap and alloys in which aluminum is the component material of chief value, in crude form, has an import duty of 3¢ per pound.

Aluminum, and alloys in which aluminum is the component of material of chief value in coils, plates, sheets, cars, rods, circles, disks, blanks, strips, rectangles and squares, has an import duty of 6¢ per pound.

Alsimin, ferrosilicon aluminum, and ferroaluminum silicon: Containing 20 but not more than 52 percent aluminum, and having silicon and iron as the other principal component elements, has an import duty of 1¼¢ per pound, not specially provided for, 2½¢ per pound.

ANTIMONY

This ore occurs in Inyo, Kern, San Benito and San Bernardino counties from which there has been occasional small production.

Mines located in San Benito, Kern and Inyo counties have produced antimony of a value of less than $20,000 in small amounts scattered over the past 25 years.

The only California manufacturing plant is that of the Harshaw Chemical Company in Los Angeles. Their present supply is being brought from Idaho.

California ores are generally lower grade than those of foreign countries, and run 40 percent to 50 percent antimony as compared to 65 percent in imported material.

California shippers could realize prices of around $2.05 per unit of one percent antimony f.o.b. Los Angeles in September of 1944, for ores containing 40 to 50 per cent Sb. Concentrates shipped from Inyo County are reported to carry 50 to 55 per cent Sb.

Tariff Rates: Antimony, as regulus or metal, has an import duty of 2¢ per pound; needle or liquated antimony, one-fourth of 1¢ per pound.

Antimony ore is imported free.

Some ores of antimony contain important amounts of gold and silver, and these are now paid for at about 75 percent of the assay value provided they contain one tenth of an ounce gold or 5 ounces of silver.

Formerly precious metal values in antimony were not included in settlements. This departure, made possible by research work of H. B. Menardi of the Harshaw Chemical Company, may make profitable some antimony deposits which could not otherwise be worked.

The demand for California antimony products is expected to be greater on resumption of ocean shipping. A new development in the flame-proofing of fabrics by antimony oxide is expected to increase demand.

Postwar employment in antimony mining and processing, however, will probably continue to be small unless new deposits are found.

Reference:

Antimony. Mineral Abstracts. Calif. Div. Mines. 1942.

ASBESTOS

A number of fibrous minerals are classed as asbestos but the most important in commerce is chrysotile, associated usually with serpentine rocks. Deposits of this variety are known in Sierra, Placer, Nevada, Calaveras and Napa counties, but the only output in recent years has come from the Kohler & Chase property in Napa County. Tremolite, an amphibole variety of fibre is mined in Shasta and Placer counties. It is mined in Shasta County by Powhattan Mining Co. of Baltimore.

Uses

Chrysotile fibre has a wide variety of uses in insulation for heat and electricity, as fabric, pipe and boiler covering, steam packing, etc., in brake lining, roofing-paper, cement, paint and many other fields.

Amphibole is used to some extent in heat insulation and as a filler, and the white variety has a limited field in chemical filters.

Markets

A considerable market could be found for suitable chrysotile fibre on the Pacific Coast and in the Orient, both of which have heretofore obtained most of their supplies from Canada. So far the California output has been small and insufficient to satisfy demand.

Prices

The value of asbestos depends on the length and quality of fibre, prices ranging at the Canadian mines from around $14.50 per ton for short fibre to about $750 per ton for No. I crude f.o.b. mines in Quebec, Canada. In California, equivalent grades would be worth $15 to $20 per ton more in the case of higher priced fibres. Low priced fibres are usually not shipped to the Pacific Coast except as they appear as a component of manufactured goods.

Tariff Rates

Asbestos, unmanufactured, asbestos crudes, fibers, stucco, and sand and refuse containing more than 15 per cent of foreign matter is imported duty free.

Production

The highest output of record was 410 tons in 1921, and in many years there has been no production. This is contrasted to an output in Canada of 300,000 to 400,000 tons a year.

Quality and Quantity

Output from Napa County is confined to short fibre of a low price range. Deposits in Calaveras and Placer counties are of fair size and reports indicate that a considerable output of chrysotile fibre satisfactory for shingle and paper manufacture might be obtained with suitable development and properly designed mills.

Cost of Production

In Canada, where mills have a capacity of 500 to 2000 tons of ore per 24 hours, with wages around $3.20 per shift for ordinary labor, the cost per ton of ore is about $2. As the average recovery of fibre is about 5 percent, the average cost of all grades of asbestos amounts to around $40 per ton.

Possible Postwar Employment

Present operation employs 20 to 30 men. This, however, appears to be a neglected field and may be capable of expansion. Some enlargement of present operations is planned.

References:

Ross, J. G., Chrysotile Asbestos in Canada. Mines Branch, Dept. of Mines, Canada. *Mem.* 707 (1931).

Bowles, Oliver, Asbestos. U. S. Bur. Mines *Bull.* 403 (1937).

———, Asbestos. Mineral Abstracts. Cal. Div. Mines. Unpublished.

BARITE

This material which occurs in many places in the State is a heavy, usually white, mineral. Consumption in California has been increasing during recent years due to extended use in oil-well drilling and in the manufacture of chemicals.

Barite is the sulphate of barium ($BaSO_4$) but is often associated with more or less barium carbonate ($BaCO_3$) present as witherite. The deposit at El Portal, Mariposa County, is the only one in the State which has separately produced important amounts of the carbonate.

Deposits of barite are known in Inyo, Los Angeles, Mariposa, Monterey, Nevada, Plumas, San Bernardino, Shasta, San Benito, Santa Barbara and Tulare counties. A deposit in Shasta County is reported to contain considerable witherite but no separate production has been made. The largest producer of barite is the deposit at El Portal, Mariposa County. The Spanish Mine at Washington, Nevada County, operated by Industrial Mineral and Chemical Company is also an important producer.

Uses

The largest use for barite in California is in the preparation of drilling muds. The manufacture of lithopone and barium chemicals accounts for 35 or 40 percent of barite used in California, and over 50 percent is required for oil-well drilling muds.

Other uses include the manufacture of rubber, glass, and as a filler in paints, paper, linoleum and oilcloths. Finely ground barite is also used as a pigment.

Markets

Inasmuch as barite at the rate of 12,000 tons or more a year is brought into California for processing, production is apparently below market demand.

Consumption in California during 1943 is estimated at around 45,000 tons and the average annual output for the past five years has been 28,962 tons, ranging from 20,000 tons to 33,000 tons annually.

Barium Products Company, a subsidary of Westvaco Chlorine Products Co., at its plant at Modesto, manufactures barium chemicals from ore mined at Battle Mountain, Nevada, although it has used several thousand tons a year in the past from California mines, chiefly in Plumas County, no California barite is used at present. Its requirements are around 1,000 tons per month. Products manufactured in its plant at Modesto are barium carbonate, oxide, peroxide, hydrate and blanc fixe. It also produces hydrogen peroxide and recovers sodium sulfide as a by-product.

Prices

Quotations on barite are usually around $6.00-$8.00 f.o.b. cars at the mine. Average value reported by California producers during 1942-1943, however, amounted to $5.86 per short ton. Prices depend to some extent on analysis and higher prices are based on a 95 percent content of barium sulfate and freedom from any considerable amount of iron.

Barite delivered at Modesto is quoted at $8 per ton to $9 per ton for material containing not less than 92 percent $BaSO_4$, not over 4 percent silica (SiO_2), a low iron content not definitely specified, and not more than a trace of manganese. Barite for drilling mud must be ground so that 98 percent passes a 200 mesh screen.

The tariff act of 1930 provides an import duty of $4 per ton on crude ore, and $7.50 per ton for material ground or otherwise manufactured.

Character and Extent of Reserves

There is a wide variation in analyses of barite found in various deposits. Generally a minimum of 92 to 95 percent of $BaSO_4$ is required, with relatively low iron content, a specification not always readily met in some of the known deposits. There are substantial known tonnages in Tulare County and elsewhere ranging from 85 to 90 percent $BaSO_4$.

While numerous deposits occur in various parts of 10 counties, developed tonnage is relatively small. Many of the deposits occur as isolated lenses which are usually mined out as required with little advance development. A few operations notably that at El Portal, Mariposa County, and Washington, Nevada County, have been conducted on a larger scale, but many of the deposits are better suited to leasers and other small operators.

The aggregate tonnage undeveloped in various deposits is probably quite large but no estimate of definite tonnage is possible. The deposit at Washington has been estimated at several hundred thousand tons.

Costs

The cost of production and transportation to consuming points must necessarily be under $8 or $9 per ton. Generally ore of suitable analysis should cost not to exceed $4 to $5 per ton on rail to yield a profit.

Considerable production in the past has come from relatively small operations particularly suitable for individual or groups, and requiring relatively little capital.

Possible Postwar Employment

Mining: A production of 30,000 tons per year at a rate of output of not less than 1.5 tons per man day would provide employment for about 65 men per 300 day-year. Realization of this would, of course assume that deposits of sufficient purity can be operated at the established prices.

Processing: Opportunity for employment in this work is limited probably to not over 25 men. Processing is largely confined to washing and grinding.

Manufacturing: About 100 men are employed in manufacturing barite chemicals, of which 50 percent are classed as common labor. This may be reduced to 75 in postwar times as more normal operating conditions return.

BARITE PRODUCTION OF CALIFORNIA

Year	Tons	Value	Year	Tons	Value
1910	860	$5,640	1928	13,406	$55,888
1911	309	2,207	1929	26,796	168,829
1912	564	2,812	1930	19,783	133,107
1913	1,600	3,680	1931	27,832	156,647
1914	2,000	3,000	1932	8,507	49,409
1915	410	620	1933	8,405	49,595
1916	1,606	5,516	1934	21,769	125,514
1917	4,420	25,633	1935	22,979	133,810
1918	100	1,500			
1919	1,501	18,065	1936–1937	41,882	245,392
1920	3,029	20,795			
1921	901	4,809	1938–1939	66,228	396,218
1922	3,370	18,925			
1923	2,925	16,058	1940–1941	57,728	377,229
1924	----------	----------			
1925	----------	----------	1942–1943	53,445	311,910
1926	4,978	38,165			
1927	17,993	90,617	Totals	415,326	$2,461,600

References:

Bradley, W. W. Barite in California. *Trans.* A.I.M.E. (1931) 96, 173.

Bradley, W. W. Barite in California, *Rep.* XXVI of State Mineralogist, pp. 45-57, 1930.

——— Barite, Mineral Abstracts, Calif. Div. Mines. Unpublished.

Weigel, W. M. Industrial Minerals and Rocks. A.I.M.E. 1937.

Santmyers, R. M. Barite and Barium Products, U. S. Bu. Mines. *Info. Cir.* 6221. (1930.)

BENTONITE AND FULLER'S EARTH

Bentonite (and probably fuller's earth) is clay-like material derived from volcanic ash which has been exposed to weathering or solutions causing the particles to deglassify and hydrate. Bentonite is generally more colloidal and lacks to a large degree the bleaching properties of fuller's earth. They are sometimes found in the same beds, and their difference in physical characteristics is often a matter of degree.

Statistics of the California Division of Mines combine output of these two materials.

Bentonite is produced chiefly in San Bernardino, Inyo, Kern and San Diego counties. Fuller's earth has come chiefly from Calaveras and Solano counties, and deposits are found in Butte, Fresno, Inyo, Kings, Los Angeles, Monterey, Riverside, San Benito and Ventura counties.

Uses

Bentonite is used in the manufacture of artificial molding sands, in oil-well drilling muds, as a water seal in construction, as a detergent, in sound and heat insulating, in insecticides, and for many other purposes.

Fuller's earth, which includes a large number of bleaching clays not always genetically related to bentonite, is used chiefly in bleaching vegetable and animal oils, but it is also used in mineral-oil refineries to accomplish various results.

Markets—Prices

There are no open quotations on these materials in California.

Bentonite is currently quoted, f.o.b. Wyoming mines, crushed and dried, in bulk, at $7.50 per ton.

Fuller's earth is quoted f.o.b. Colorado mines at $9.00 per ton.

The average value per ton reported by California producers, f.o.b. mines, in recent years, is as follows:

1939	$12.35
1940	16.70
1941	8.96
1942	9.05
1943	10.30

Tariff Rates

Bentonite: Unwrought and unmanufactured has an import duty of 75¢ per ton; wrought or manufactured, $1.62½ per ton.

Fuller's Earth: Unwrought and unmanufactured, $1.00 per ton; wrought or manufactured, $2.00 per ton.

Bentonite (Fuller's Earth) Production of California, by Years

Year	Tons	Value	Year	Tons	Value
1899	620	$12,400	1922	6,606	$48,756
1900	500	3,750	1923	3,650	55,125
1901	1,000	19,500	1924	5,290	67,295
1902	987	19,246	1925	5,280	91,842
1903	250	4,750	1926	23,552	250,192
1904	500	9,500	1927	13,018	154,764
1905	1,344	38,000	1928	53,232	501,743
1906	440	10,500	1929	15,541	170,563
1907	100	1,000	1930	12,522	177,964
1908	50	1,000	1931	13,960	222,583
1909	459	7,385	1932	4,295	57,670
1910	340	3,820	1933	4,605	60,621
1911	466	5,294	1934	6,168	69,325
1912	876	6,500	1935	10,204	68,372
1913	460	3,700	1936	10,185	165,131
1914	760	5,928	1937	8,425	140,261
1915	692	4,002	1938	9,374	113,164
1916	110	550	1939	11,284	138,854
1917	220	2,180	1940	10,360	174,002
1918	37	333	1941	18,369	164,582
1919	385	3,810	1942	7,453	67,503
1920	600	6,000	1943	11,480	118,257
1921	1,185	8,295	Totals	260,333	$2,591,923

Character and Extent of Reserves

Beds classed as bentonite or fuller's earth in State publications are widely scattered in 16 counties. Thickness varies from 5 to 20 feet or more and few of the deposits have been fully explored. The aggregate tonnage of all grades is large but no adequate records are available as to the quality and utility of the various deposits.

Postwar Outlook

The largest use for California bentonite is in the preparation of oil-well drilling muds hence the activity in bentonite will correspond to a large extent with the amount of drilling done. However, other uses are increasing and the industry expects to employ some additional men after the war. Present employment amounts to about 25 men at the plants and pits. Technical, sales and administrative employees number about 25 men. Postwar employment is expected to be 50 to 65 men.

References:

Industrial Minerals and Rocks. A. I. M. E. 1937.

Bentonite (Fuller's Earth) Mineral Abstract, Cal. Div. of Mines. Unpublished.

BITUMINOUS ROCK

This material is essentially an uncemented sandstone which is saturated with and held together by a natural asphaltic constituent, probably the residue from the evaporation of a crude petroleum deposit. Bituminous rock is still used to a limited extent for road dressing in those districts adjacent to available deposits, though the manufacture of asphalt at the oil refineries has largely superseded the direct use of the native material. Some of the Santa Cruz County production is put on the market as a material which can be laid cold. This material is especially applicable and valuable for patch jobs, industrial floors and short stretches such as driveways.

During 1943, production fell sharply. Postwar road repairs may be expected to provide increased demand. From 15 to 30 men are employed at the quarries. Reserves are large. Research might develop additional demand for this material.

Output for several years has come from one producer each in Santa Barbara and Santa Cruz counties.

Its average reported value is around $4.00 per ton.

Bituminous Rock Production of California, by Years

The following tabulation shows the total amount and value of bituminous rock quarried and sold in California, from the records compiled by the State Mining Bureau, annually since 1887:

BITUMINOUS ROCK

Year	Tons	Value
1887	36,000	$160,000
1888	50,000	257,000
1889	40,000	170,000
1890	40,000	170,000
1891	39,962	154,164
1892	24,000	72,000
1893	32,000	192,036
1894	31,214	115,193
1895	38,921	121,586
1896	49,456	122,500
1897	45,470	128,173
1898	46,836	137,575
1899	40,321	116,097
1900	25,306	71,495
1901	24,052	66,354
1902	33,490	43,411
1903	21,944	53,106
1904	45,280	175,680
1905	24,753	60,436
1906	16,077	45,204
1907	24,122	72,835
1908	30,718	109,818
1909	34,123	116,436
1910	87,547	165,711
1911	75,125	117,279
1912	44,073	87,467
1913	37,541	78,479
1914	66,119	166,618
1915	17,789	61,468

Year	Tons	Value
1916	19,449	$66,561
1917	5,590	18,580
1918	2,561	9,067
1919	4,614	18,537
1920	5,450	27,825
1921	8,298	43,192
1922	4,624	13,570
1923	2,945	11,780
1924	6,040	14,922
1925	2,681	10,724
1926	3,863	21,577
1927	3,515	17,704
1928	4,966	33,832
1929	3,320	14,360
1930	8,525	36,075
1931, 1932	23,653	109,140
1933, 1934	36,793	130,301
1935, 1936	41,681	133,344
1937, 1938	36,128	139,242
1939	16,546	63,612
1940, 1941	29,709	86,903
1942, 1943	39,798	156,193
Totals	1,432,988	$4,585,162

Reference:

Bituminous Rock, Cal. Mineral Abstracts: Div. of Mines. Unpublished.

BORATES

Borax was first found in California by Dr. John A. Veatch in the waters of Lick Springs, Tehama County. This discovery on January 8, 1856 was followed by his identification of borax at Borax Lake, in Lake County in September of that year. Production commenced at that point in 1864 with an output of 12 tons.

The borax deposit at Searles Lake in San Bernardino County was found by John Searles in 1868. Operations were started in 1874 and continued intermittently until 1895. The mining of colemanite and associated massive ulexite found about 1887, displaced most of this ''alkali lake'' operation. The discovery of high-grade deposits of kernite and borax (tincal) in the Kramer District in Kern County in 1925, and the successful extraction of borax from brines at Searles Lake resulted in the abandonment of most colemanite operations, although one operator continues to mine this mineral in Inyo County.

While borate minerals are found in many places in Inyo, Kern, Lake, Los Angeles, Riverside, San Diego, Ventura, and San Bernardino counties, production now comes only from Inyo, San Bernardino and Kern.

Borax from brines are extracted by the American Potash & Chemical Corporation and West End Chemical Company from Searles Lake, San Bernardino County, and by Pacific Alkali Company from Owens Lake, in Inyo County. The Pacific Coast Borax Company mines kernite and borax (tincal) at Boron, Kern County, and United States Borax Co. mines colemanite and ulexite near Shoshone, Inyo County.

California, before the war, supplied a large part of the world's consumption of borates.

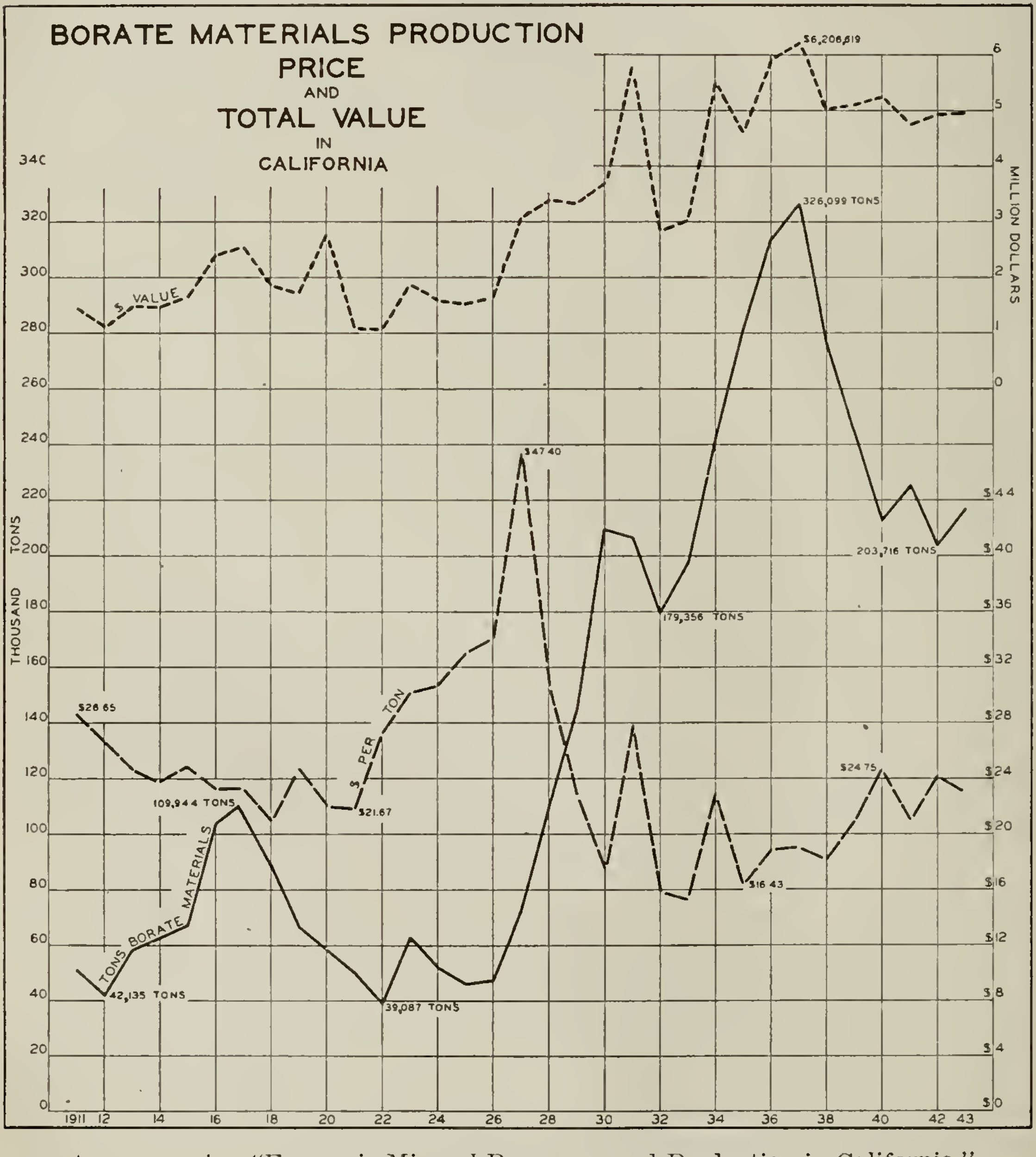
Uses. Markets

Few products of the minerals industry have so wide applications in both industry and for home use. Before the war the largest uses were in the manufacture of glass and enamelware. Because of the shortage of steel for the manufacture of bathtubs, stoves, refrigerators and other enamelware, consumption for this purpose has been greatly reduced.

The largest wartime use is in glass bottles and other containers and glass kitchenware has almost entirely replaced tinplate and enamelware.

Paint, drugs, food processing, tanning, wood preserving, cosmetics, paper, insecticides, agriculture and a large number of other industries use borax in one form or another.

During the past 20 years the use of borates in the United States has increased threefold due chiefly to expansion of glass and enamelware requirements.



Accompanying "Economic Mineral Resources and Production in California," California Division of Mines Bulletin 130

Prices

During the war the price of technical grade granular borax in bulk delivered, has been fixed at $41.50 per short ton. The freight allowance from California to the Atlantic Coast is $17.60 per ton.

Tariff Rates

Borax, crude or unmanufactured, and borate of lime, borate of soda, and other borate material, crude and unmanufactured, not specially provided for, is imported duty free.

Character and Extent of Reserves

The combined reserves of Searles Lake, San Bernardino County; Kramer, Kern County, and Owens Lake, Inyo County, are believed to be in excess of 15,000,000 tons of anhydrous boric acid, sufficient to continue the present rate of production for possibly 50 years or more. There are in addition large quantities of colemanite which could be used in the event presently utilized sources some day are exhausted.

Production

The graph herein shows the trend of this industry since 1910. Prior to that time growth starting in 1864 was gradual and slow due in part to foreign competition and in part to slow industrialization prior to 1899. The trend was rapidly upward thereafter, although there have been some setbacks.

Total production from 1864 to 1943 inclusive has been 5,180,608 tons valued at $128,874,462.

Production of Borate Materials in California, 1910-1943.

Year	Tons	Value	Year	Tons	Value
1910	16,828	$1,177,960	1927	72,462	$3,043,260
1911	50,945	1,456,672	1928	109,722	3,378,552
1912	42,135	1,122,713	1929	144,678	3,312,085
1913	58,051	1,491,530	1930	209,869	3,686,817
1914	62,500	1,483,500	1931	206,405	5,753,037
1915	67,004	1,663,521	1932	179,356	2,856,470
1916	103,523	2,409,375	1933	197,495	3,019,513
1917	109,944	2,561,958	1934	240,696	5,524,262
1918	88,772	1,867,908	1935	280,249	4,602,064
1919	66,791	1,717,192	1936	313,389	5,911,093
1920	127,065	2,794,206	1937	326,099	6,206,619
1921	50,136	1,096,326	1938	276,144	5,014,237
1922*	39,087	1,068,025	1939	244,819	5,110,807
1923	62,667	1,893,798	1940	212,358	5,254,154
1924	52,070	1,599,149	1941	224,986	4,745,872
1925	46,124	1,526,938	1942	203,716	4,929,553
1926	47,605	1,625,298	1943	216,687	4,953,174

*Recalculated to 40% 'anhydrous boric acid' equivalent beginning with 1922.

Postwar Outlook

Borax production in 1943 was at a level around 65 percent of the high rate of output obtained in 1937 when production was 326,099 tons. This is due to a number of factors foremost of which are the loss of foreign markets, decline in the enamelware industry because of steel shortage and the shortage and inefficiency of labor. This has been offset in some

degree, however, by the increase in the output of glass containers and kitchenware. Tin plate, when available, will undoubtedly again replace glass in containers as glass is fragile and heavier than metal in containers of equivalent capacity.

Glass packaging, however, has been enormously extended during the war, and may maintain some of its increased volume because glass does provide more attractive packaging than metal for some products, and greater sales value may offset greater cost and other objections to glass.

The resumption of enamelware manufacture, and restoration of foreign markets is expected to maintain the industry at its present rate of activity after the war. Three of the five operations in California recover potash, soda or other products in the same operation, and the continued production of borax presumes a market for these collateral products.

Postwar Employment

Companies producing borax reported 1965 employees in 1943. Most of these are required in the processing operation, less than 100 being engaged in active mining work. American Potash and Chemical Company, West End Chemical Company and Pacific Alkali Company, obtain their raw materials entirely from brine pumped from wells. Pacific Coast Borax Co. ships ores and borax ''concentrates'' to Wilmington, California, for refining. The United States Borax Company mines colemanite and ulexite which is treated at nearby works.

The forecast is for continued employment of about 2000 men in the postwar period.

Recommendations

There are substantial reserves of colemanite (calcium borate) remaining, but for the most part this cannot compete as a source of refined borax. This material, however, might because of its chemical and physical properties, find uses in industry and it is recommended that the Division of Mines undertake a study and conduct research work on its utilization.

References:

Borax. Mineral Abstracts. Cal. Div. of Mines. Unpublished.

Bailey, Gilbert E., The Saline Deposits of California. Cal. Min. Bur. Bull. 24. 1902.

Industrial Minerals and Rocks. A. I. M. E. 1937.

BROMINE.

The first commercial production in California of bromine and bromine compounds was begun during 1926 by the California Chemical Corporation in its plant at Chula Vista, San Diego County, from salt-works bittern waters. This same plant has been recovering magnesium chloride for a number of years. Bromine is also now being made at a similar bittern-water plant at Newark, Alameda County, and beginning in 1940 from brines at Searles Lake, San Bernardino County. The 1942 output is an increase in amount and value as compared with that of 1941. The

1942 yield was the largest annual production on record in California; annual details of which are concealed under the 'Unapportionment' item so as not to reveal the production of the two companies operating these plants. In 1943 output exceeded that of any previous year by about 250,000 pounds.

The total commercial production of bromine in California is as follows:

Year	Tons	Value	Year	Tons	Value
1926			1935		
1927 *	158	$120,480	1936 *	805	$191,465
1928			1937		
1929			1938 *	914	327,823
1930 *	802	552,933	1939		
1931			1940 *	1,579	528,245
1932			1941		
1933 *	559	146,547	1942 *	2,206	741,790
1934			Totals	7,023	$2,609,283

* Annual details concealed under 'Unapportioned.'

As the present output is a by-product from brine operations, direct employment in bromine production is small. Production at the present rate is expected to continue during the postwar period.

Bromine, and all bromine compounds not specially provided for, have an import duty of 10¢ per pound.

Reference:

Bromine. Mineral Abstracts. Cal. Div. Mines. Unpublished.

BUILDING STONE

Granite, marble, sandstone, slate, tuff and other volcanic rocks, diorite, granodiorite and others, are quarried for building and monumental purposes. Marble has been mined in various parts of the State, operation recently being limited to San Luis Obispo and Solano counties.

Granite has been quarried in Fresno, Lassen, Madera, Nevada, Placer, Riverside, Sacramento, San Bernardino, San Diego counties. Tuff and other volcanic stone has been quarried in Sonoma County. Eleven quarries were operated in 1942 and in 1943.

Uses

The chief use in recent years has been for monumental stone. Formerly a large output went into building construction.

Markets

In 1929, output was valued at $1,169,271 much of which was for building construction. Markets have fallen off since then; concrete construction, which is cheaper, having taken the place of granite and other building stone. In Federal construction, stone from points outside the State is often specified by the Federal architects notwithstanding that equally suitable stone exists in California.

Prices

Granite is sold by the ton, cubic foot and other measures which make difficult the determination of a unit price.

Competition from sources outside of the State is such that granite blocks for building construction can often be imported, notwithstanding long freight hauls, at less than the cost of the local product.

Tariff Rates

Building stone, not specially provided for: Hewn, dressed, pointed, lined, or polished, or otherwise manufactured (including paving blocks) has an import duty of 30 percent ad valorem; unmanufactured, not dressed, pointed, pitched, lined, hewn, or polished, 12½¢ per cubic foot.

Character and Extent of Reserves

Granite of excellent quality and a range of color from light grey to black, is available in quantity so large it would be difficult to make any accurate estimate.

VALUE OF GRANITE PRODUCTION OF CALIFORNIA

Year	*Value*	*Year*	*Value*
1920	$495,732	1933	$183,706
1921	725,901	1934	249,083
1922	676,643	1935	339,917
1923	760,081	1936	244,243
1924	1,211,046	1937	207,738
1925	1,853,859	1938	131,386
1926	655,332	1939	145,194
1927	1,398,443	1940	198,896
1928	763,996	1941	261,661
1929	1,169,271	1942	186,872
1930	855,477	1943	148,160
1931	636,741		
1932	398,676	Total Value	$13,893,054

Reference:

Structural and Industrial Materials of California. State Mining Bureau *Bull.* 38. 1906.

Marble production in the State has declined steadily in recent years as shown in the production table. Reserves in the State, which are large, include beautiful and serviceable varieties for almost any conceivable purpose of construction and decoration. Marble from Vermont and Alaska has displaced much of the local product heretofore used.

MARBLE PRODUCTION OF CALIFORNIA, BY YEARS

Year	Cubic feet	Value	Year	Cubic feet	Value
1920	[b]29,531	$92,899	1932	[b]25,506	$42,505
1921	30,232	98,395	1933	9,039	23,178
1922	38,321	127,792	1934	[b]7,185	10,759
1923	28,015	124,919	1935	[b]	9,884
1924	[b]61,579	140,253	1936	[b]	23,011
1925	35,664	116,105	1937	[b]	23,667
1926	34,806	119,999	1938	[a, b]	6,015
1927	[b]42,308	103,689	1939	[b]	14,822
1928	[b]34,324	82,190	1940	[b]	15,189
1929	[b]72,881	93,661	1941	[b]	14,448
1930	[b]65,775	82,194	1942	[c]	[c]
1931	[b]37,776	81,760	1943	9,085	3,250

[a] Includes onyx and serpentine.
[b] Includes onyx and travertine.
[c] Not available.

Sandstone production like that of marble has declined, as shown in the following table:

SANDSTONE PRODUCTION OF CALIFORNIA, BY YEARS

Year	Cubic feet	Value	Year	Cubic feet	Value
1920	10,500	$2,300	1932	41,793	$13,286
1921	10,150	2,112	1933	25,980	10,888
1922	900	1,100	1934	21,738	14,245
1923	7,000	13,000	1935	38,426	9,268
1924	6,700	3,600	1936	24,705	9,180
1925	14,704	14,326	1937	73,190	15,680
1926	34,100	17,500	1938	43,107	9,384
1927	222,900	205,400	1939	54,380	12,494
1928	134,100	43,250	1940	27,992	13,083
1929	177,655	49,881	1941	60,958	13,143
1930	160,704	56,404	1942	20,427	8,587
1931	110,244	30,950	1943	3,250	9,085

High grade sandstone is available in large quantities and has been quarried in Colusa, Los Angeles, Monterey, Napa, San Bernardino, San Luis Obispo and Shasta counties. The demand for lighter colored stone and the wide use of concrete has sharply curtailed this industry.

Slate is found in Amador, El Dorado, Glenn, Mariposa, Placer and Tuolumne counties. It has been mined in Amador, El Dorado and Tuolumne counties in recent years, although more recently only one quarry in El Dorado County has been in operation.

While the deposits are of substantial size and the quality excellent, the demand for this product has been largely replaced by cheaper forms of roofing and current output is chiefly in the forms of granules used to coat roofing paper and as slate filler. A part of the production was, however, in the form of crude slate.

Production for the past 10 years has ranged in value from $18,000 to about $50,000. The industry being small, employs but a few men.

Postwar demand for civilian construction should promote an active demand for roofing materials.

Postwar Outlook

Granite and marble are particularly suitable for Federal and State structures and, if California material is specified, the present rate of activity could easily expand 5 to 10 fold for new buildings now under consideration.

Postwar Employment

The building stone industry at present employs about 50 men, not including those engaged in sculpture and polishing. This rate will probably be retained but could be expanded to several hundred men if Federal and State structures are built calling for local stone.

Recommendation

It is recommended that vigorous effort should be made by State officials to insure use of domestic stone in future Federal structures in which dimension stone is specified.

CALCIUM CHLORIDE

Production of this material in California amounts to around 3500 to 4000 tons per year with a value of $4.00 per ton, or an annual average total value for 1941-1942 of $14,428.

Output in California represents a by-product from the extraction of salt and other saline materials from seawater and it is also produced from inland deposits.

The California Rock Salt Company, near Amboy, San Bernardino County, pumps brine having a density of 40° Baumé from its salt deposits, which is shipped in tank cars. The Hill Chemical Company purchases brine at that point, operating a plant producing flake calcium chloride.

Its chief use is in road stabilization in which its hydroscopic properties maintain moisture.

Production in the United States is far in excess of any known demand, eastern production being largely as a by-product in the manufacture of soda ash in the ammonia-soda process. Probably 90 percent of output is discarded for lack of markets. California output in recent years has come from salt deposits at Amboy, San Bernardino County; Niland, Imperial County, and from seawater brines at Chula Vista, San Diego County.

Tariff Rates

Calcium: Chloride, crude; nitrate, and cyanamid or lime nitrogen is imported duty free.

Markets may be further developed in refrigeration, air-conditioning, preventing evaporation and freezing; as a dessicator in oil pipe-lines, the extraction of lithium from spodumene, in freeze-proofing ore and coal, in curing concrete, and in calcium soap lubricants.

California demand in some of these fields is probably capable of expansion, and the further utilization of deposits in San Bernardino County should be given further study, as mentioned by Herbert Waterman in the chapter herein on the chemical industries.

Reference:

Calcium Chloride. Mineral Abstracts. Calif. Div. Mines. Unpublished.

CALCIUM SILICATE

The only important known source of this material in California is controlled by the Johns Manville Product Corp., and located in the Radamacher District near Randsburg, Kern County.

No recent shipments have been reported.

It is used chiefly in the manufacture of rock wool. Tests made by A. M. M. Russell, Testing Engineer of the State Harbor Commission, indicate that the addition of the mineral wollastonite, the metasilicate of calcium, increases the strength of concrete.

Potential sources are believed to be substantial, but utilization of this material in industry on any large scale is as yet apparently uncertain.

Reference:

Wollastonite: Mineral Abstracts. Calif. Div. of Mines. Unpublished.

CARBON DIOXIDE GAS

There were two companies producing carbon dioxide from wells near Niland, Imperial County, and one from springs near Hopland, Mendocino County in 1943, to a total of 227,724 M cu. ft. valued at $248,126. The 1943 output was the highest of record in California, but was lower in value than in 1942 when production amounted to 193,143 M cu. ft. valued at $310,000.

Carbon dioxide gas is found many places in nature and is produced commercially from wells and springs whose waters are highly charged with the gas. It is used as a gas in the manufacture of carbonated beverages and dry ice, and in the chemical reduction of carbonates; as dry ice and liquefied as a refrigerant, as a source of power, and in the chemical industry. It has been stated that the amount of butyl rubber is only limited by the amount of dry ice available.

Carbon dioxide gas was first produced commercially in California in 1894. This material came from a drift on the 575 level of the Santa Isabel shaft of the New Almaden Quicksilver mine at New Almaden, Santa Clara County. The drift was bulkheaded and a pipe placed through the bulkhead for the gas to be drawn off, it then being compressed into cylinders and used in the manufacture of soda water.

In 1933 carbon dioxide gas was again produced, this time from wells drilled near Niland, Imperial County. On November 1, 1934, a dry-ice plant was put into operation for condensation of the carbon dioxide produced from the above wells.

CARBON DIOXIDE GAS PRODUCTION IN CALIFORNIA, BY YEARS

Year	*M Cu. Ft.*	*Value*
1938 } * 1939 }	131,189	$13,799
1940	97,660	23,877
1941	138,862	258,563
1942	193,143	310,000
1943	227,424	248,126
Totals	894,456	$938,346

* Annual details concealed under 'Unapportioned.'

The present demand appears due largely to use in the aircraft industry. In this field it is used to create low temperatures similar to those prevailing in the stratosphere to test various parts of planes. It is also used to cause shrinkage of rivets during construction.

The industry employs around 75 to 100 men. To what extent it will be able to retain the present output is uncertain. There is an increasing demand in refrigeration of foodstuffs, and in transportation of cut flowers.

References:

Mineral Resources of Imperial County, Calif. Jour. Mines & Geol. Calif. Div. of Mines, 1942, April, 1942.

Symons, Henry, Calif. Mineral Production for 1942. Calif. Div. of Mines, *Bull.* 126, 1943.

CEMENT

Portland cement is made by calcining and heating to incipient fusion (approximately 2800°F.) an intimate and finely pulverized mixture of various raw materials containing lime, alumina, silica and iron. Limestone is the chief source of lime, although oyster shells and various marls are also used where they are economically available. The silica, alumina, and iron are usually combined in clay or shale. For certain special cements iron ore or roasted pyrite may be added to alter the combined lime and alumina, which is deleterious if present to excess. Gypsum approximating 3 per cent of the clinker weight is always added to regulate the set.

The definition of Portland cement adopted by the American Society of Testing Materials is as follows:

"Portland cement is the product obtained by finely pulverizing clinker produced by calcining to incipient fusion an intimate and properly proportioned mixture of argillaceous and calcareous materials, with no additions subsequent to calcination except water and calcined or uncalcined gypsum."

The value of Portland cement produced in California since the industry was founded in 1891, to 1943 inclusive, is the impressive total of $552,278,854, making it the third most important mineral industry of the State with totals exceeded only by petroleum and gold. Prior to this the Benicia Cement Company in 1859-1860 commenced production of a natural hydraulic cement at the rate of 50 to 100 barrels a day which was used in the San Francisco area.

Stone suitable for manufacturing Portland cement occurs in many parts of the State but cement is a heavy commodity; freight is a relatively large proportion of the delivered cost, and plants are necessarily located as near as possible to important markets. There are 10 plants in the State, the northernmost in Calaveras County, the southernmost in Riverside County. Others are located in Contra Costa, Kern, San Mateo, Santa Clara, Santa Cruz and San Bernardino counties. One plant is located in each of these counties except San Bernardino which has three.

Uses. Markets

The uses of cement in construction are too well-known to require any detailed description here. During the war much of the output has been required for military purposes, while civilian building construction and civilian roads have been neglected. The advent of heavy aircraft requiring long runways with strength to sustain the impact involved, has opened a new field for cement which is expected to be permanent.

Cement for large projects such as dams is sold direct to the Government, State or to the contractor. In road work, which is largely done by Federal, State or other government subdivisions, sales are generally to the contractor. Large amounts are, however, distributed by dealers in building materials and this is generally more profitable per barrel than that sold for large projects.

Chiefly because of a divergence in market interests, producers have divided themselves into two groups—one representing northern California, with 5 plants, one each in Calaveras, Contra Costa, San Mateo, Santa Clara and Santa Cruz counties and the other covering southern

California with 5 plants, 3 in San Bernardino, and one each in Kern and Riverside counties. There is in addition to this one plant in Los Angeles County which grinds clinker produced by other concerns.

Plants located in Merced and San Benito counties have been closed and are not likely to be again operated at their present locations.

Northern California plants have produced much of their cement for heavy construction such as dams, whereas the southern California plants have marketed their cement largely for residence and other building construction.

Shipments from the northern California plants were somewhat larger than those of the southern plants during 1941-42-43 and 1944. Prior to that time southern California plants led in output for many years. Plant capacity in both areas is in excess of demand, and plants (except during this war) have been seldom operated at capacity for any protracted period.

Prices

Quotations are seldom published in trade journals, but are published in price lists issued by the different companies. Usually large quantities, such as for dams are subject to negotiation between buyer and seller.

The average value of shipments at the plant, reported by producers in recent years is as follows:

Year	*Value per Bbl.*
1939	$1.42
1940	1.27
1941	1.34
1942	1.53
1943	1.50

The base price fixed by Office of Price Administration for southern California plants is $1.73 per bbl. with 10 cents per bbl. discount for bulk shipment. The base price in northern California is $1.75 per bbl. with 10 cents per bbl. discount for bulk.

Tariff Rates

Roman, Portland, and other hydraulic cement or cement clinker has an import duty of 4½¢ per 100 lbs., including weight of container.

White nonstaining Portland cement, 6¢ per 100 lbs., including weight of container.

Keene's cement, and other cement of which gypsum is the component material of chief value: Valued at $14 per ton or less, has an import duty of $3.50 per ton; valued above $14 and not above $20 per ton, $5 per ton; valued above $20 and not above $40 per ton, $10 per ton; valued above $40 per ton, $14 per ton.

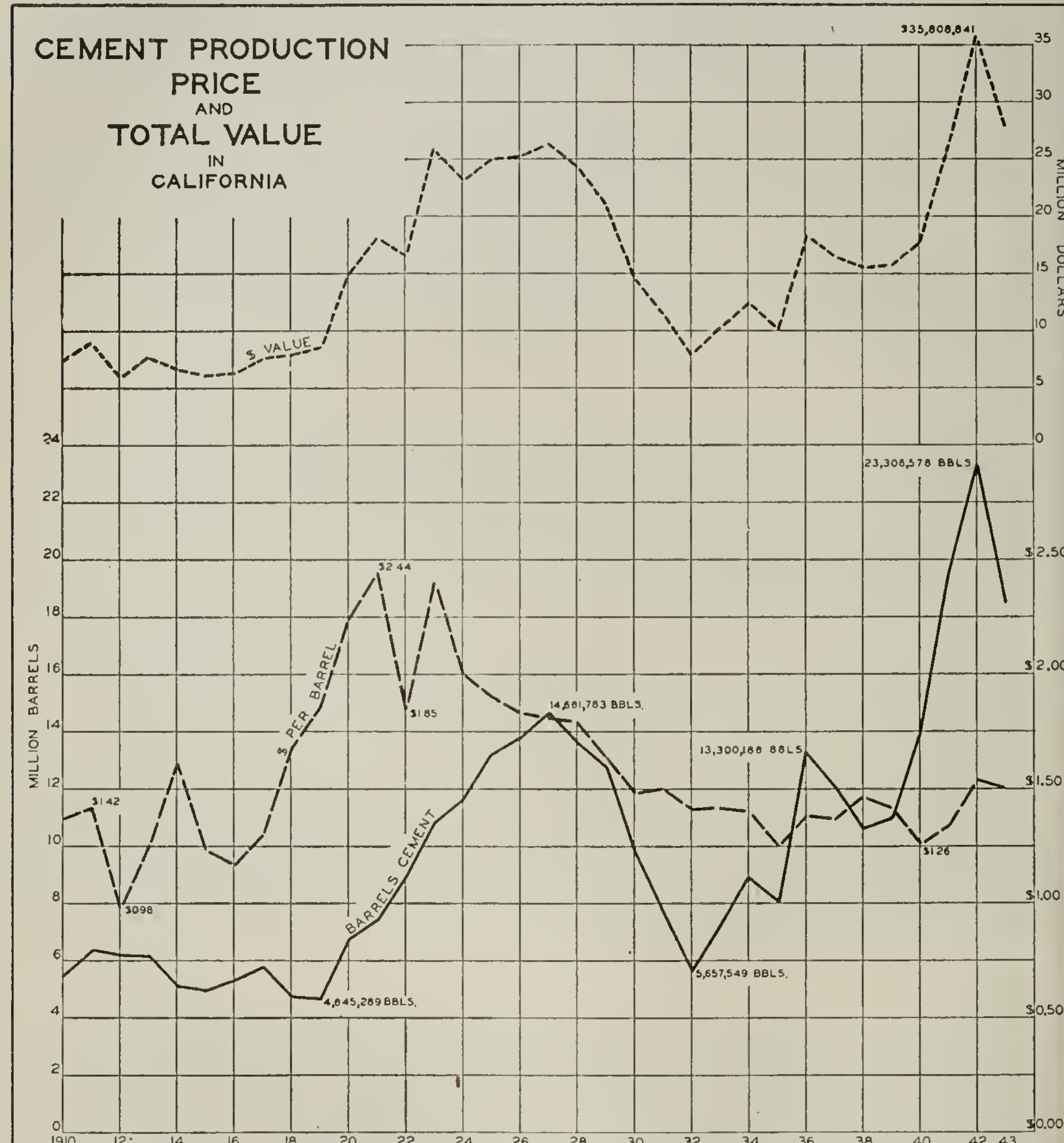
Cement, not specially provided for, has an import duty of 10 per cent ad valorem.

Character and Extent of Reserves

Detailed estimates of reserves of cement rocks are not available, but authorities agree that the known supplies are very large and will last 50 years or more, at the present rate of production. Further supplies are available but at a somewhat higher cost.

Production

The wide range of activity of the cement industry is clearly shown in the accompanying graph. Output in 1942 reached an all time high of 23,306,578 barrels and was nearly 60 percent above the previous peak of 14,661,783 barrels produced in 1927.



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Only on rare occasions has any substantial part of the capacity been utilized, the rate of operations in recent years being as follows:[a]

Year	*Operation—Percent of Capacity*
1935	35.0
1936	53.8
1937	53.7
1938	46.1
1939	43.5
1940	59.1
1941	77.0
1942	86.3
1943	67.0

[a] U. S. Bureau of Mines.

Based upon the above, the rated capacity of California plants is 27,100,000 barrels per year. The plant of Yosemite Portland Cement Co., with a rated capacity of 900,000 barrels annually, was closed down in July, 1944, and the plant will be moved elsewhere, possibly to a foreign country.

Notwithstanding this, California leads all other States in output, outranking New York (which has usually been second), in 1941 by 19 percent and by 43 percent in 1942. In 1943 Texas had taken second place with New York third in the list. During that year California output exceeded its nearest competitor by 81 percent.

The rate of operation in 1944 reflects a continued sharp drop from the high of 1942. This is due to the completion of many war projects and the absence of any large amount of civilian road or building construction.

Activity in cement is profoundly affected by large construction projects such as dams, bridges and aqueducts which provide large but intermittent markets. For this reason it is difficult to establish what might be regarded as a normal base period. Output in the period of 1924-1929 is comparable, although somewhat higher than that of 1935-1940, suggesting a norm of about 12,000,000 barrels, a figure slightly above 50 percent of the peak production of 23,306,578 barrels in 1942.

In 1939 output was 10,984,033 barrels. Taking that year as a base of 100, comparable activity for the following 5 years was as follows:

1939	100	
1940	+ 27	
1941	+ 77	
1942	+ 112	
1943	+ 68	
1944	+ 7	(estimated at 60% of 1942)

Production tables show healthy growth with only one period of serious setback—between 1930 to 1935 inclusive.

Cement Production of California, by Years

Year	Barrels	Value	Year	Barrels	Value
1891	5,000	$15,000	1918	4,772,921	$7,969,909
1892	5,000	15,000	1919	4,645,289	8,591,990
1893	----------	----------	1920	6,709,160	14,962,945
1894	8,000	21,600	1921	7,404,221	18,072,120
1895	16,383	32,556	1922	8,962,135	16,524,056
1896	9,500	28,250	1923	10,825,405	25,999,203
1897	18,000	66,000	1924	11,655,131	23,225,850
1898	50,000	150,000	1925	13,206,630	25,043,335
1899	60,000	180,000	1926	13,797,173	25,269,678
1900	52,000	121,000	1927	14,661,783	26,474,935
1901	71,800	159,842	1928	13,625,231	24,463,287
1902	171,000	423,600	1929	12,794,729	21,038,565
1903	640,868	968,727	1930	9,831,938	14,575,731
1904	969,538	1,539,807	1931	7,693,712	11,510,655
1905	1,265,553	1,791,916	1932	5,657,549	7,967,107
1906	1,286,000	1,941,250	1933	7,284,031	10,331,395
1907	1,613,563	2,585,577	1934	8,936,085	12,445,616
1908	1,629,615	2,359,692	1935	8,086,292	10,120,721
1909	3,779,205	4,969,437	1936	13,300,188	18,314,589
1910	5,453,193	7,485,715	1937	12,072,062	16,546,229
1911	6,371,369	9,085,625	1938	10,561,037	15,502,574
1912	6,198,634	6,074,661	1939	10,984,033	15,616,219
1913	6,167,806	7,743,024	1940	13,955,255	17,673,202
1914	5,109,218	6,558,148	1941	19,531,608	26,248,694
1915	4,918,275	6,044,950	1942	23,306,578	35,808,841
1916	5,299,507	6,210,293	1943	18,515,085	27,865,466
1917	5,790,734	7,544,282			
			Totals	349,735,022	$552,278,854

Postwar Outlook. Employment

The downward trend, so abrupt in 1943 and 1944, may be modified to some extent by exports to the Pacific war area (designated by the cement industry as "off-shore" business) and by increased military needs on the western coast as war in the Pacific area is stepped up after V.E.-day.

The postwar outlook for cement in California appears to be bright. There is a large backlog of needed civilian building construction in both large and small units for normal purposes, and this has been further increased to a critical point by a large increase in population. The 1940 census showed a population of 6,907,000 which is estimated to have increased 23.4 percent to 8,450,000 by January 1944.[a] This increase of 1,543,000 persons has not been accompanied by corresponding housing construction. A large number have been placed in housing projects near war plants. The closing of these plants and the temporary character of the dwellings will result in the need for other types of buildings in different locations.

While some of the population increase are temporary residents, it has been estimated that the population of California in 1950 will be close to 9,000,000.[a]

The construction of freeways, bridges and repairs of highways neglected during the war is expected to further increase activity.

To what extent reconstruction in the Far East will require Californian cement remains to be determined.

Employment in recent years and output per man is shown in the following table:

	Employees Quarries and Mills	*Annual output per employee Barrels*	*Annual production Total barrels*
1938	1,993	5,300	10,561,037
1939	1,825	6,000	10,984,033
1940	2,213	6,300	13,955,255
1941	2,790	7,000	19,531,608
1942	2,889	8,100	23,306,578
1943	2,725	6,800	18,515,085

It is characteristic of cement plants that operating crews cannot be reduced below a number required for minimum operation, but that production can be raised far above minimum without a corresponding increase in employees. This situation is reflected in the figures of annual output per employee, ranging from 5,300 to 8,100 barrels.

Employment during 1943 ranged from 2,725–2,800 men, and this had fallen in the latter part of 1944 possibly 22 percent to around 2,200 men.

Composite opinion of this industry is that 2,500 men may be required in postwar years.

The outlook for cement will in all probability follow to a considerable extent the pattern to be expected in other branches producing construction materials; crushed stone, sand and gravel; to a somewhat lesser extent, lime and gypsum.

[a] How Many Californians? Pamphlet No. 1. State Reconstruction and Reemployment Commission. July, 1944.

The latter would share correspondingly in building construction, but are not dependent on road and engineering construction to any substantial degree.

References:

Minerals Yearbook. U. S. Bur. of Mines. Various Years.

Portland and Other Hydraulic Cements in 1943. Min. Markets Report No. MMS 1229. Aug. 15, 1944.

Industrial Minerals and Rocks. A. I. M. E. 1937.

CHROMITE

Chromite mining in California on any considerable scale is essentially a war-time activity. This is clearly illustrated by the graph of production since 1910. Chrome mining began in 1869 with shipments of 1500 to about 3500 tons per year during the following 25 years.

From 1915 to 1919 output exceeded 2000 tons a year, reaching an all time peak of 73,955 tons in 1918. Annual output was less than 2000 tons for the next 20 years when in 1939 it rose to 3936 tons.

Chromite is widely distributed in the state, occurrences having been reported in 40 of the 58 counties. In 1918, 29 counties contributed to the state's output. During the present war production has come chiefly from Calaveras, Del Norte, El Dorado, Fresno, Glenn, Humboldt, Placer, San Luis Obispo, Shasta, Siskiyou, Sonoma, Tehama and Tuolumne counties.

Uses. Markets

Chrome is one of the important components in many alloy steels. Ores containing 48 to 50 per cent chromic oxide and a chrome-iron ratio of 3 : 1 are preferred for this purpose. Ore of this grade has been produced in California but the bulk of production has been of much lower grade.

Chromite used for refractories and chemical manufacture may be of lower grade than that required in alloy manufacture. It is used in the form of bricks with or without varying amounts of magnesite, and in building or repairing furnaces.

The manufacture of chromium chemicals is the third important outlet for chrome ores. These are used in dyeing, tanning, electroplating and the manufacture of pigments.

Prices

Prior to the war, ore containing 48 per cent Cr_2O_3 was quoted at $23-24 per long ton, f.o.b. New York. The Metals Reserve Company, a government agency, in 1942 established prices and specifications for domestic ores and purchasing depots were placed at various locations in the state. This had the effect of stimulating production which rose sharply to 45,253 tons in 1942 and 56,201 tons in 1943 (calculated to a basis of 45 per cent Cr_2O_3.)

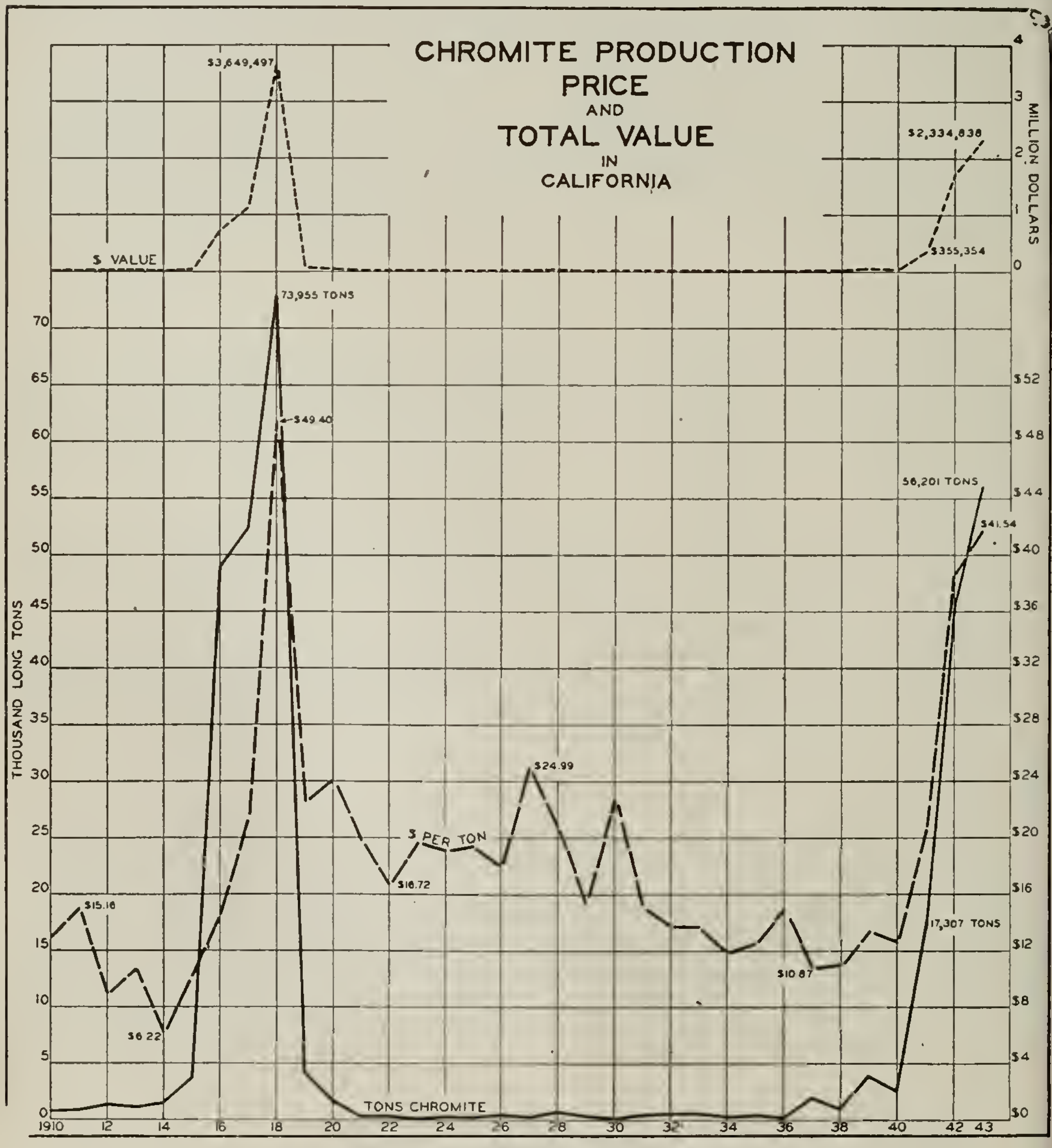
The base price established was \$1.10 per unit of 1 percent Cr_2O_3 f.o.b. rail-shipping point, equal to \$52.80 per long ton for ores containing 48 per cent Cr_2O_3 with a chromium-iron ratio of 3 : 1. Penalties and premiums were established for grades above or below standard. Originally low-grade ores were accepted but on September 1, 1944 the schedule was revised to exclude ore containing less than 42 percent Cr_2O_3 and having a chromium-iron ratio of less than 2 : 1. This had the effect of closing many operations.

Tariff Rates

Chromite or chrome ore is imported duty free.

Character and Extent of Reserves

While there are no known deposits in California comparable in size to some foreign deposits, occurrences are widespread and, with a sufficiently high price and an outlet for off-grade material, can produce 50,000 to 100,000 tons a year. While there are some occurrences of high-



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grade ore, these have been relatively small, and the bulk of reserves are lower grade than ores normally imported. Developed tonnages have never been large.

Production

Total production from 1869 to 1943 inclusive has been 394,521 tons.

Production during the present war has been at a rate considerably lower than that of the corresponding period of World War I, as shown in the following table:

1915	3,725	1939	3,936
1916	48,379	1940	2,599
1917	52,379	1941	17,307
1918	73,955	1942	45,253
1919	4,314	1943	56,201

This has been due in part to the exhaustion of easily accessible deposits and in part to the lower price fixed by Metals Reserve Company. During World War I prices paid for 48 percent ore ranged from $1.25 to $1.50 per unit as against $1.10 per unit in 1942-1943. Specifications also were less exacting. Offsetting this, however, was greater assistance rendered producers by the U. S. Bureau of Mines and U. S. Geological Survey in determining the character and extent of ore deposits, and financial aid provided by the Reconstruction Finance Corporation.

Production in 1942 came from 61 operations and in 1943 from 41 operations.

Total Production of Chromite of California, by Years

Year	Tons	Value	Year	Tons	Value *
1869-1887	48,028	$609,324	1917	52,379	$1,130,298
1888	1,500	20,000	1918	73,955	3,649,497
1889	2,000	30,000	1919*	4,314	97,164
1890	3,599	53,985	1920	1,770	43,031
1891	1,372	20,580	1921	347	6,870
1892	1,500	22,500	1922	379	6,334
1893	3,319	49,785	1923	84	1,658
1894	3,680	39,980	1924	350	6,700
1895	1,740	16,795	1925	191	3,712
1896	786	7,775	1926	393	7,063
1897	----------	----------	1927	225	5,063
1898	----------	----------	1928	729	15,179
1899	----------	----------	1929	327	5,025
1900	140	1,400	1930	84	1,905
1901	130	1,950	1931	441	6,737
1902	315	4,725	1932 } [a]		
1903	150	2,250	1933 } [a]	1,206	16,587
1904	123	1,845	1934	294	3,498
1905	40	600	1935	488	6,111
1906	317	2,859	1936	221	3,314
1907	302	6,040	1937	1,918	20,830
1908	350	6,195	1938	982	10,864
1909	436	5,309	1939	3,936	52,673
1910	749	9,707	1940	2,599	32,796
1911	935	14,197	1941	17,307	355,354
1912	1,270	11,260	1942	45,253	1,741,080
1913	1,180	12,700	1943	56,201	2,334,838
1914	1,517	9,434			
1915	3,725	38,044	Totals	394,521	$11,281,214
1916	48,943	717,244			

* Recalculated to 45% Cr_2O_3 beginning with 1919.
[a] Included under 'Unapportioned.'

Postwar Outlook

Three hundred men were employed in chrome mining in 1943 with an average output per man of about 185 tons. Prewar output amounted to but a few hundred tons a year, and unless local industries are established which can utilize California ore, employment after the war will apparently be inconsequential.

There is, however, some probability of expanding local industries. The U. S. Bureau of Mines in a pilot plant to be built at Redding, Shasta County, will determine the practicability of using local chromite to produce metallic chromium. There is some possibility of a continuation of ferro-chrome manufacture at Portland, Oregon, and ferro-alloys may also be made at San Francisco and at the Fontana plant of Kaiser Company in San Bernardino County.

The manufacture of chromium chemicals in California is also being considered.

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Manganese and Chromium in California. Bull. 76. Cal. Div. of Mines. 1918.

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CLAY AND CLAY PRODUCTS

By J. Clark Sutherland [1]

Clay comprises certain earthy materials which, by their physical properties and fineness, possess plasticity when wet, and, when used ceramically, harden under fire. Mineralogically, they are aggregations of hydrous aluminum silicates, including kaolinite, montmorillonite, halloysite and dickite. While genetic and chemical classifications are sometimes employed; i.e., bentonite, residual, coal measure, etc., clays are ordinarily classified according to their principal commercial use. While clays overlap in their properties, the main use to which they can be put defines their characteristics close enough for the trade. Thus, in the ceramic industry, the major consumer, clays are ordinarily labeled and sold under such names as plastic or flint fireclay, refractory bond clay, or grog fireclay, when their main use is in refractories; china, stoneware, pottery, ball, etc., if they are white vitrified or semi-vitrified firing; sewer pipe, tile, brick, etc., if they are used in red-burning vitrified products. Clays used without burning comprise such materials as bentonite, which is dealt with in another chapter; kalsomine clays, used as a paint and paper filler; and certain chemical industry clays such as blast-furnace flux, tap-hole clay, etc.

Location of Deposits

Clays occur in commercial quality and quantity in practically all of California's 58 counties, of which 22 actually produce clay. By far the most important of these deposits are in three districts: Lincoln, in Placer County; Ione, in Amador County; and Corona-Alberhill, in Riverside County. These districts contribute practically all of California's output of the purer types of materials, which come from formations

[1] Geologist. Pacific Clay Products, Los Angeles.

apparently confined to the Eocene geologic period. Important other counties are Calaveras, Contra Costa, Orange, San Bernardino and San Diego.

According to figures collected from State publications for 1943, there are as follows:

a. 65 clay pits without ceramic plants.
b. 40 clay pits with nearby ceramic plants.
c. 20 ceramic plants without nearby pits.

These are distributed as follows, according to classification a, b, and c, above defined:

County	a	b	c
Alameda	4	4	2
Amador	4	1	
Calaveras	1		
Contra Costa	3	2	3
Humboldt	1	1	
Kern	6	1	
Los Angeles	14	13	9
Marin	1	1	
Orange	5	2	
Placer	3	1	
Riverside	5	2	
Sacramento	3	3	1
San Bernardino	2		
San Diego	3	2	
San Joaquin	2	2	1
San Luis Obispo	1	1	
San Mateo			1
Santa Barbara	1	1	
Santa Clara	2	2	3
Stanislaus	1		
Sutter	1		
Tulare	1	1	
Ventura	1		
Totals	65	40	20

Uses

Clays are used both in their fired and unfired condition.

When used raw, the governing factors are textures, color, bonding strength, freedom from irritants, and absorptive qualities. Raw clays are used as fillers in paper, paint, etc., where whiteness, fineness and freedom of grit are of primary importance. When clays are used for bleaching, they must possess good absorptive qualities, either in their natural state or when activated with acid. Clays are also used widely for bonding, such as molding sands, where permeability, strength and refractoriness are of importance.

When clay is to be used in its fired condition, the governing factors are its physical behavior and condition in both the fired and raw state. Its fired uses are myriad, comprising the entire gamut of refractory, structural, decorative and household ceramic wares. These uses will be dealt with in more detail later.

Markets

Practically all of the clays produced in the state are used therein. California has few clays of sufficient quality to ship outside of the state. Similarly, practically all of the tonnage used in the state is produced

locally, usually within 100 miles of the consumer. Most manufacturers mine clays from their own or leased properties, and often sell to one another. A few concerns are purely clay mine operators.

Prices

Because of the widespread occurrence of clay, prices for the common types are very low. For the common red-burning types, such as brick, building tile, and sewer pipe, prices at the mine range from $.75 to $2.00 per ton. For the rarer types of clays, such as high-alumina refractory bonds, prices go as high as $7.00 per ton. These prices, plus a low delivery charge, makes it possible to compete with clays from outside the state and effectively establishes a ceiling. On a royalty basis, prices paid the land owner range from a few cents to $1.50 per ton, depending on quality, stripping ratios and cheapness of transportation to the market. When specially prepared, as by fine grinding, or by firing, the prices show a proportionate increase to the cost of the process.

Tariff Rates

Clays or earths, including common blue clay and Gross-Almerode glass-pot clay, not specially provided for: unwrought and unmanufactured, have an import duty of $1.00 per ton; wrought or manufactured, $2.00 per ton.

China clay or kaolin has an import duty of $1.75 per ton.

Character and Extent of Ore Reserves

For those clays used in the common brick, hollow tile and kindred low-grade ceramic ware, which are usually high in iron and lime, and heterogeneous in character and texture, an almost unlimited supply exists.

Clays used in sewer pipe, roofing and quarry tile, conduit, and similar vitrified products, must be dense burning low-vitrification-point materials and fairly homogeneous in texture. Reserves of this type of clay are considered ample for the next 50 years in the central California area, but will be largely depleted within 25 years in southern California unless new and large deposits are found.

White-burning low-vitrification-point clays, mostly of desert origin, are ordinarily used in wall tile, stoneware and the like, and the percentage used is minor. As such they can stand a considerable transportation charge and an ample supply for 50 years is at hand.

High-alumina, low-flux clays used in refractories have never been plentiful in California and are now rapidly approaching depletion. Central California has supplies for the more rigid specification materials for about 25 years; southern California for about ten. For low-grade refractory material, there are reserves for about double those periods. Of late years, considerable quantities of refractory clay have been coming from out of state sources, such as New Mexico, Utah and Colorado. As our local clays approach these materials in price, undoubtedly higher proportions will be used.

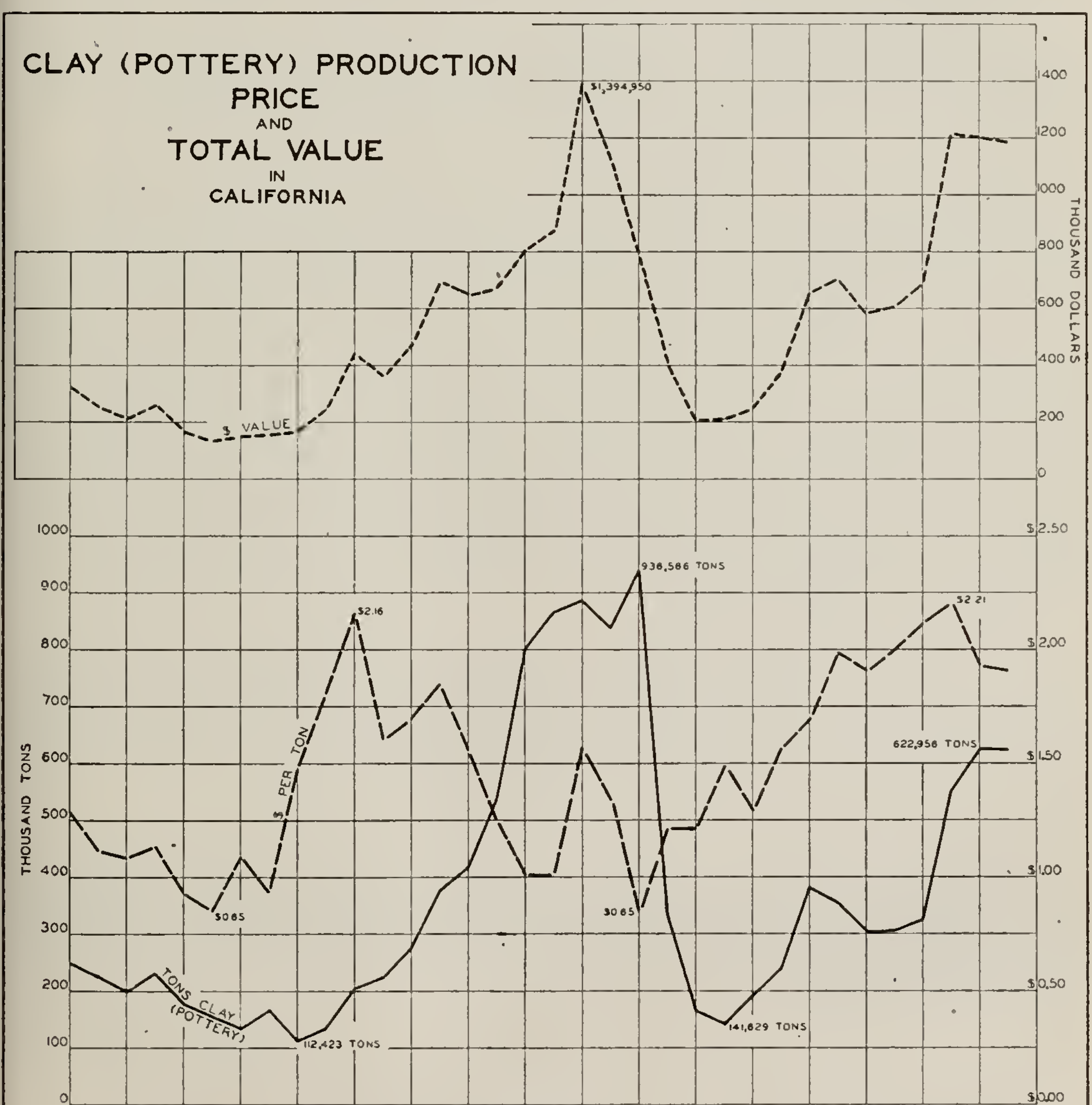
Clays used outside the ceramic industry are usually of fairly rigid specifications. Paper and paint fillers must be white and uniformly fine-grained. Blast-furnace clays must be high in alumina, but can be high in iron. Probably not more than 10 years' supply of these types exists within 100 miles of the various consumers.

The overall picture for reserves in the clay industry is fairly good. With sufficient increase in delivered price to offset increased freight tariffs in areas where local shortages might exist, supplies for California's clay consuming industries are sufficient to last for many years.

Production and Costs

Clay products are primarily consumed in or attendant to building construction, and, as such, their production closely follows construction activity. For all types of clay exclusive of brick, hollow tile and bentonites, termed "pottery clay" by the Division of Mines, the following graph illustrates the wide fluctuation of production in past years:

The relative production pattern within the state, as compiled by the Division of Mines, was as follows:



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Pottery Clay

During 1943, forty-one properties operated in 18 counties in California, and reported an output of 622,019 net tons of pottery clay, valued at $1,185,240, f.o.b. shipping point for crude materials; as compared with 55 properties in 21 counties producing 622,958 tons, worth $1,200,293 in 1942. The average value was $1.90 per ton for both years. The 1943 production distributed by counties was as follows:

County	Tons	Value
Amador	[a]105,815	$236,396
Kern	[b]96,619	261,243
Los Angeles	[b]39,910	53,454
Orange	[a]38,039	160,389
Riverside	120,574	214,918
Alameda [a], Calaveras, Contra Costa, Humboldt, Marin, Placer, Sacramento, San Bernardino, San Diego, Santa Clara, Stanislaus, Sutter, Ventura [b]*	221,062	258,840
Totals	622,019	$1,185,240

[a] Includes fire sand.
[b] Includes oil-well drilling mud.
* Combined to conceal the output of operators in each.

The above figures do not include clay reported as used in the manufacture of brick and hollow building tile or the bentonite clays.

Brick and Hollow Building Tile

Brick and hollow building tile were manufactured in California during 1943 in 34 plants in 16 counties, of which there was a total of 70,219 M of common brick, valued at $840,921; 40,265 M of fire brick, valued at $3,174,868; 3,451 M of glazed, pressed, vitrified, and fancy brick, valued at $138,456; and 16,947 tons of hollow building tile, valued at $214,430; the entire output having a total value of $4,368,675. The 1943 production showed a decrease in amount and value in all types of brick and building tile as compared with that of 1942, which was 117,739 M of common brick, worth $1,296,449; 55,843 M of fire brick, worth $3,655,210; 7,353 M of glazed, pressed, fancy, and vitrified brick, worth $412,966; and 24,703 tons of hollow building tile, worth $344,342; with a total value of $5,708,967.

The 1943 output came from twelve plants in Los Angeles County; three in Contra Costa County; two each in Alameda, Amador, Sacramento, and San Joaquin counties; and one each in Humboldt, Kern, Orange, Placer, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, Santa Clara, and Tulare counties.

The total output of ceramic products manufactured in California during 1943 had a total value of $13,817,552, as compared with $16,270,372 in 1942. The distribution by products for 1943 is shown in the following tabulation:

CERAMIC PRODUCTS, CALIFORNIA, 1943

Product	Number of producers	Tons	Value
Architectural terra cotta, chimney pipe and flue lining	6	6,262	$436,933
Drain tile	13	6,924	114,208
Sewer pipe	9	100,551	3,140,350
Roofing tile	10	4,934	94,134
Floor, faience, mantel and handmade tile	13		1,274,167
Red earthenware	5		182,062
Stoneware and chemical stoneware	5		520,593
Chinaware and semi-vitreous tableware	4		3,906,791
Conduit	4	2,401	58,937
Fire-clay and high temperature cements	5	14,390	521,324
Miscellaneous: electric stove blocks, vents, art pottery, garden furniture, sanitaryware, and plumbing fixtures, electrical porcelain, glass tank backs, grog, dolls, fire tile, clay shapes, light-weight aggregate, segment blocks, glazed flower-pots, glazed kitchen ware, sundries, specialties, and various	19		3,568,053
Total value			$13,817,552

Of the ceramic products, increases in total value were registered in 1943 by stoneware and chemical stoneware, fire clay and high-temperature cements, and conduit; all others showed a decline in value.

It will be noted that the total volume of business showed a 15% decline in 1943 from 1942. Because of high direct costs for materials and labor and reduced output, but few manufacturers produced at a profit during this year. Labor rates and material costs are not expected to appreciably decline in the post-war years, so that most manufacturers are seeking relief by material handling or technologic revisions to lower their prime costs per unit.

Postwar Outlook

There seems no question concerning the fact that the market for clay products will be very active after the war. Building in middle class homes and in stores is expected to be very active. Sewage disposal networks have already lagged far behind war construction. Dish ware and pottery should be very active, both because of the large consumer demand and the recent assumption of national leadership in styling by California's potteries.

The outlook for the clay industry after the war is very encouraging. Although the industry is at present largely devoted to war work, it is anticipated that the backlog of business that has been accumulating due to the cessation of public building, sewer extensions, etc., and the prohibition of private building during the war will permit the clay products industry to expand its overall operations an estimated 50%.

Estimates by personnel within the ceramic industry for individual products show a range of 10 to 20% increase in refractories, particularly in special shapes but with a probable decline in straight brick; 35% increase for those products which parallel construction, such as tile, face brick, etc.; 50 to 75% increase for sewer pipe; and 50 to 200% increase for pottery.

Possible Postwar Employment

In 1943, the pattern of employment within the industry was as follows:

CLAY AND CLAY PRODUCTS

1943 Employment in Pits and Plants

County	Number of operators	Number employed
Alameda	4	162
Amador	3	52
Contra Costa	6	677
Kern	4	38
Los Angeles	22	2,286
Placer	3	267
Orange	4	77
Riverside	5	176
Sacramento	3	39
San Joaquin	3	44
Santa Clara	4	147
11 counties [a]	11	90
Totals	72	4,055
Estimated small operators not reporting		250
Estimated total		4,305

[a] Includes Calaveras, Humboldt, Marin, San Bernardino, San Diego, San Luis Obispo, San Mateo, Santa Barbara, Sutter, Tulare and Ventura counties.
NOTE: Employment was estimated where operators did not furnish data.

In the section dealing with postwar outlook, an overall 50% increase in production was estimated for the postwar years. This predicted increase in production will not, however, mean a 50% increase in employment. During the war, technologic and labor-saving advances have been considerably accelerated. In mining, for instance, the greater use of mechanical equipment for stripping and mining has made it possible to increase greatly the output of clay per man with little or no increase in labor. The greater utilization of material handling equipment within plants has similarly cut the man-hours per-ton of product. The normal industrial rate of increase in productivity of labor is in terms of 1% per year. This has been at least doubled during the war years.

It is estimated that 6,125 persons will be employed in mining clay and manufacturing clay products and allied materials in the postwar years. This estimate is compiled from the opinions of producers employing more than 60% of the 1943 total. These data showed that postwar employment would be increased an average of 40% over 1943 when 4,305 persons were employed.

References:

Dietrich, W. F. The Clay Resources and Ceramic Industry of California. Bull. 99. Calif. Div. Mines. 1928.

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COAL

Coal is known to exist in 43 counties of the State, the first discovery having been made in San Luis Obispo County in 1847. The first record of production was in 1861, since which years output has ranged from a few tons a year to a high of 1,362,463 tons in 1874. Total output up to 1943 amounted to 5,269,790 tons of a declared value of $23,397,785. During the last few years, the average annual production has been around 400 tons per year.

Production has come chiefly from the Mt. Diablo District in Contra Costa County and the Tesla District in Alameda County. Monterey County was a large producer for a short time and lesser amounts have been shipped from Amador, Fresno, Orange, Riverside, Siskiyou and Trinity counties.

Reserves are certainly more than 100 million tons, those of Mendocino and Shasta counties alone having been estimated at 35 million tons.

Coal production ceased to be an important factor in California mineral output after the development of petroleum and natural gas.

All California coal falls in the class of lignite to sub-bituminous.

Tariff Rates: Coal, coke and compositions used for fuel in which coal or coal dust is the component material of chief value, whether in briquets or other form, is imported duty free.

Research on the possible utilization of California coal has been inadequate and the size of reserves and character of some of the deposits justifies investigation.

Reference:

Coal: Mineral Abstracts. Calif. Div. Mines. Unpublished.

COPPER, LEAD AND ZINC

By Hadley R. Bramel[1]

The greater bulk of California's war output of copper, lead and zinc is the result of revived activity among districts of past importance. Although very little of these metals has come from properties of strictly recent discovery-date, of considerable importance are deposits which until recently had no production record but had the status of more or less developed prospects.

The largest single producer of copper in 1943 and 1944, for example, was the Dakin or Gray Eagle mine in Siskiyou County. Discovered in 1896 this mine was extensively explored years ago but because of its inaccessibility and the unfavorable market conditions prevailing over the intervening years the mine was not brought into production until 1943. Other current operations such as the Big Bend in Butte County and the Blue Moon in Mariposa County were, until recently, undeveloped prospects.

It is convenient to consider the California base metal mines as belonging to two groups: the predominantly copper-zinc deposits which are distributed over the mountainous regions of the northern part of the State, and the predominantly lead-zinc deposits situated principally in Inyo County.

[1] Department of Mining Engineering, Stanford University.

Some 19 operations in 1944 accounted for over 95 percent of the total output. Of these 9 are in Inyo County, 3 in Calaveras and one each in Siskiyou, Shasta, Butte, Amador, Mariposa, Orange and San Bernardino counties. Two of the 19 operations, speaking strictly, are not engaged in mining. At Copperopolis the Pacific Mining Co. has constructed a 1200-ton mill to rework a 600,000 ton tailings pile left from earlier operations. At the Darwin District, Inyo County, L. D. Foreman is engaged in shipping slag to the Selby Smelter. One operation coming into the productive class late in 1944 was included as of future promise. This is the operation of the Golden Queen Mining Co. at Cerro Gordo in Inyo County. In addition to this list of 19 are several newcomers of possible future importance. The location, product and the names of operations of active mines are listed in the Directory of Producers, Appendix A.

Copper

The industrial applications of copper are largely determined by physical properties such as high electrical conductivity, high mechanical strength, high corrosion resistance.

Uses of Copper (Percent of Total U. S. Consumption) 1940

Electrical manufacture	23.1
Rod and wire	23.6
Automobile	9.1
Buildings	9.5
Castings	3.3
Radio receivers	3.0
Manufactures for export	13.8
Other	14.6
	100.0

Lead

Some of the principal uses of lead are based on certain desirable properties of its compounds rather than the physical properties of the metal. The extensive use of white and red lead pigments and the lead-plate storage battery are examples.

Uses of Lead (Percent of Total U. S. Consumption) 1940

Storage batteries	28.2
Cable covering	13.7
White lead	8.4
Red lead and litharge	7.6
Building	8.3
Ammunition	7.2
Foil	3.0
Bearing metal	3.1
Other	20.5

Zinc

The major use of zinc is in galvanizing; that is, in forming protective coatings for steel. A second large use is as an alloying metal with copper to form brass. Of increasing importance are the alloys of zinc with aluminum and other metals. These alloys are used in the die-casting industries. The following table lists domestic uses for 1940.

Uses of Zinc (Percent of Total U. S. Consumption) 1940

Galvanizing	40.0
Brass making	32.3
Die castings	16.1
Rolled zinc	8.1
Other	3.5

Markets

The shipping product of California base-metal mines is either raw ore or mill concentrates. The purchasers of these materials are the smelting companies. Only one smelter is now situated in California, that of the American Smelting and Refining Company at Selby. This smelter purchases gold, silver and lead ores and concentrates. Copper and zinc ores or concentrates must be shipped outside the State.

The productive capacity of the western states in metals is far in excess of their local consumption, hence the ultimate market for the major portion of refined metals is on the Atlantic coast and is centered in New York City. Supplementary markets such as the lead-zinc market at East St. Louis usually quote a slightly lower price, the difference being somewhat less than the freight rate to New York.

The services offered by each smelter are limited usually to one or two of the base metals. A few reduction works are equipped to treat all three.

When important quantities of ore or concentrates are involved, smelter terms are subject to negotiation. The ores comprising the smelter charge are carefully proportioned from materials having several necessary fluxing ingredients. For the purposes of one smelter a given ore may contain undesirable compounds which at another smelter may be much in demand. It is apparent which of the two would offer the most advantageous rates. From a practical standpoint, however, expedience in transportation often limits the miner's bargaining opportunities.

Certain metals such as arsenic, antimony and sometimes zinc, interfere with smelting. In such cases the miner not only loses the value of such metals but may be penalized for them if they are present in excess of specified amounts.

In 1944 California ores and concentrates were being shipped to Selby, California; Tacoma, Washington; Bradley, Idaho; Garfield and Tooele, Utah, and Douglas, Arizona. A few of the nearer smelters are listed in the table shown at top of the next page.

State	Company	Smelter	Location	Ores treated
Arizona	Phelps Dodge Corporation	Copper Queen Branch	Douglas	Gold, silver, copper and lead ores, and concentrates.
California	American Smelting & Refining Company		Selby	Gold, silver, and lead ores and concentrates.
Idaho	Bunker Hill & Sullivan	Bunker Hill	Bradley	Gold, silver, lead and zinc ores and concentrates.
Montana	Anaconda Copper Mining Co.	Anaconda Reduction Works	Anaconda	Gold, silver, copper and zinc ores and concentrates.
Nevada	Kennecott Copper Corp.		McGill	Gold, silver, and copper ores and concentrates.
Utah	International Smelting Co.		Tooele	Gold, silver, copper and zinc ores.
	American Smelting & Refining Company		Garfield	Gold, silver, copper and zinc ores.
	U. S. Smelting, Refining and Mining Co.		Midvale	Gold, silver, lead and zinc ores and concentrates.
Washington	American Smelting & Refining Company		Tacoma	Gold, silver, and copper ores and concentrates.

Prices

The domestic prices quoted in the metal market reports such as those in Engineering and Mining Journal refer to the price the buyer is willing to pay for the refined metal cast in standard shapes and laid down, usually in New York or vicinity.[1] These quotations are usually accepted by both miner and smelter as a basis for settlement.

The mining of the common metals in times of peace has been a highly competitive industry. Average prices have been closely related to the low cost of production achieved at the large and efficient mines. The tendency of advancing technology to lower costs is offset in the long run by depletion of the richer ores and by the increasing difficulty of extracting ore from greater depth.

Copper

The average trend in the price of copper has been slightly downward in the last 50 years. During this period the price has fluctuated from a high of over 30¢ per pound in 1917 to an all-time low of 4.775¢ in 1933. In 1942 the base price was set at 11.75¢ by the O.P.A. Marginal mines were paid premiums to stimulate production. The average price paid for all domestic copper in 1943 was 13¢, and this agrees with figures reported by California producers. The price and California production in recent years are shown in the accompanying graph.

Lead

The average price for lead has shown no definite trend in 50 years. The metal reached 11¢ in 1917 and fell to 2.75¢ in 1932. The price set by the O.P.A. in 1942 was 6.35¢ at East St. Louis. The average U. S. price for 1943, including premiums was 7.5¢, and this agrees with figures submitted by California producers. The recent standard price of lead is shown in the accompanying graph.

[1] Zinc is often quoted at East St. Louis. The New York quotation is usually about 0.15¢-0.30¢ per pound higher.

Zinc

In times of peace the price of zinc has closely approximated that of lead. During World War I and the present war, however, the price of zinc has exceeded that of lead. Zinc reached 18¢ in 1916 and fell to 2.53¢ in 1932. The O.P.A. price is now 8.25¢ and the actual price including premiums paid for all domestic production in 1943 was 10.8¢. California producers, however, reported receiving an average price of 7.62¢ per lb. The accompanying graph shows the price for zinc for several years.

Tariff Rates

Copper ore; regulus of, and black or coarse copper, and cement copper; old copper, fit only for remanufacture, copper scale, clippings from new copper and copper in plates, bars, ingots, or pigs, not manufactured or specially provided for, have no import duty.

Copper ingots has an import duty of 4¢ per pound.

Lead-bearing ores, flue dust, and mattes of all kinds have an import duty of $\frac{3}{4}$¢ per pound on the lead contained therein.

Lead metal has an import duty of 1 1/16¢ per pound.

Zinc-bearing ores of all kinds, except pyrites containing not more than 3 percent zinc, have an import duty of $\frac{3}{4}$¢ per pound on the zinc contained therein.

Zinc metal has an import duty of $\frac{7}{8}$¢ per pound.

CHARACTER AND EXTENT OF ORE RESERVES

The term "ore reserves" to be of practical significance should be qualified by statements indicating on what basis a given estimate was made. In general, however, the term is meant to include: visible ore, such as ore developed by mine workings; ore indicated by exploratory drilling; and such additional ore as may be reasonably expected for geological reasons. Certain assumptions as to continuity are used in any case.

With respect to continuity of ore, deposits fall within two extremes: those whose unexplored extensions can be predicted with accuracy, and those in which appreciable continuity is absent. The majority of ore deposits, particularly the smaller ones, approach the latter extreme and when all ore in sight is exhausted, even though experience may have proved further exploration always to have been profitable, in strict sense there are no ore reserves.

In California the continuity of ore among the copper and copper-zinc mines in the northern part of the State is generally more predictable than that among the lead-zinc mines of Inyo County.

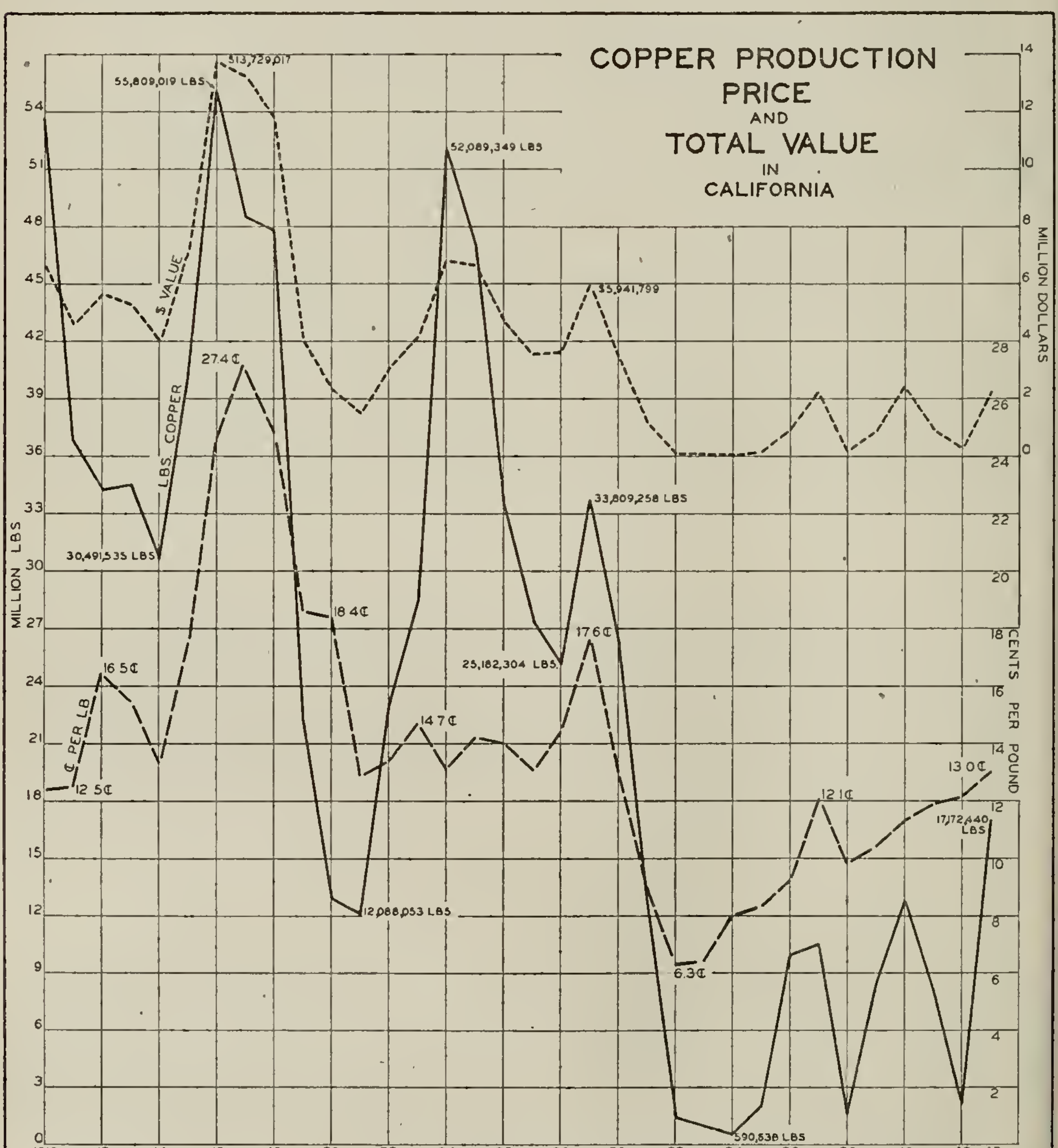
A common practice among well established mining companies is to set aside for exploration sufficient money to keep firm reserves at least a year or two ahead of mining. Several of the companies now engaged in base-metal mining in California undertook production as a temporary expedient in wartime involving contracts to supply a stated quantity of metal within time limits. Under these circumstances little attempt has been made to develop further reserves as these are high-cost mines and can only operate at relatively high prices.

Available figures on ore reserves are given in the following table:

ORE RESERVE ESTIMATES—CALIFORNIA MINES

Mine	Tons	Grade				Date	References
		Cu %	Zn %	Au oz.	Ag oz.		
Walker	[1,2]7,000,000	1.81	--------	--------	--------	1936	Leith and Liddell, 1936, p. 56.
Balaklala	[2]3,000,000	2.70	--------	--------	--------	1931	Rand and Sturgis, 1931, p. 495.
Engels	[2,3]327,800	1.75	--------	--------	--------	1930	Engels Copper Mining Co. Annual Report 1929. p. 17.
Keystone	[4]197,400	2.99	--------	--------	--------	1927	Engels Copper Mining Co. Annual Report 1929. p. 6.
Blue Ledge	[2,5]150,000	4.4	2.0	0.125	5.0	1933	Shenon, 1933, p. 13.
Penn	101,000	3.96	9.36	0.068	2.76	1926	Julihn and Horton, 1936, p. 112.

[1] Upwards of 35,000,000 lbs. of copper have been produced since 1936.
[2] Not operating.
[3] Over 4,000,000 lbs. of copper were produced in 1930.
[4] Estimated as "probable ore" in Discovery Shaft area which has not been worked since 1927. Later developments may have added to this figure.
[5] Described as "blocked out."



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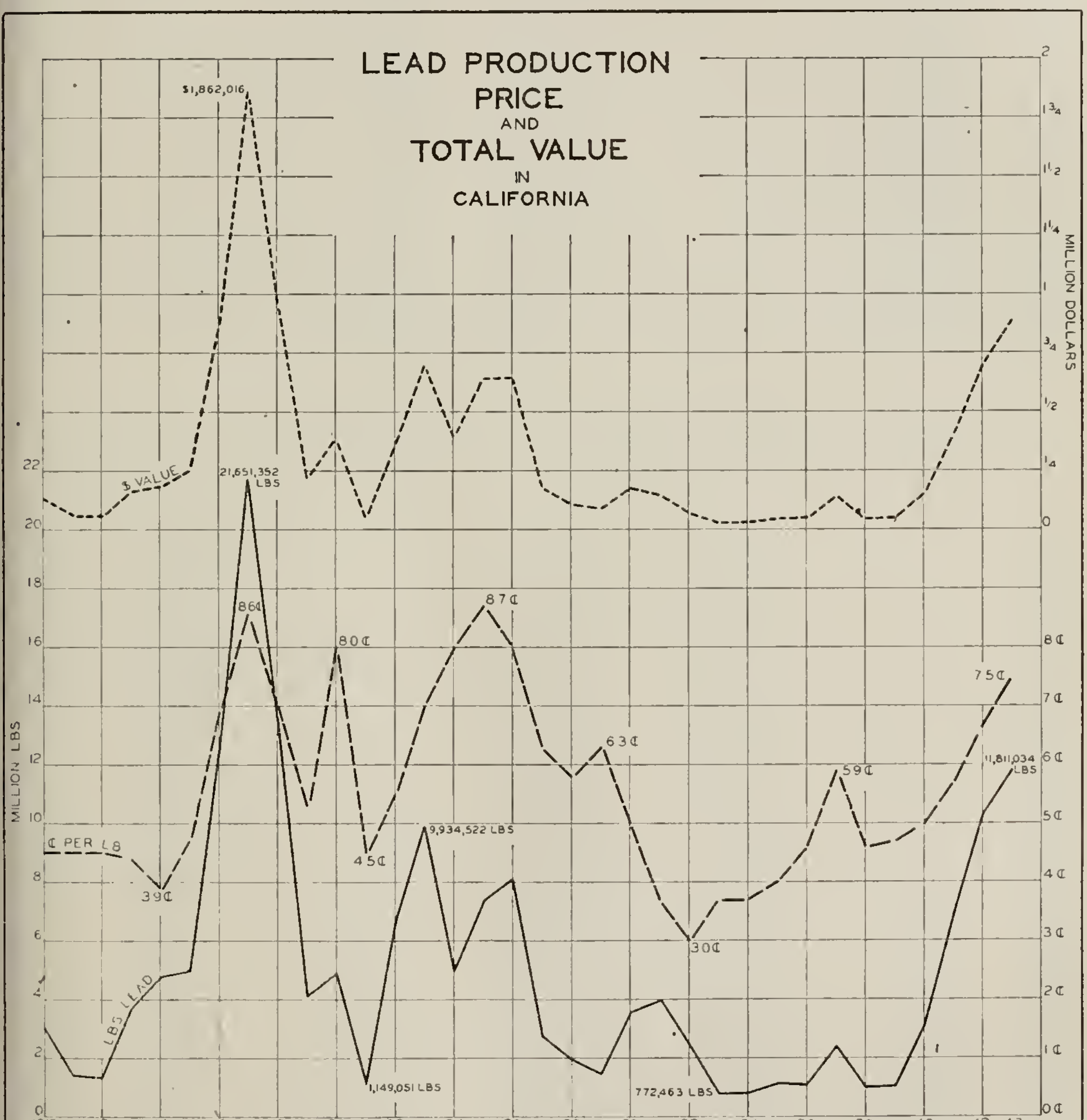
The above are included because the figures have been published elsewhere. They do not represent the ultimate figures of potential reserves of the State.

Ira B. Joralemon [1] has expressed the opinion that there are probably substantial reserves, the exploration and development of which could be brought about if prices were fixed over a period of several years of 15¢ per lb. for copper, and 8¢ per lb. for lead and zinc.

Production

The California production of copper in 1943 was greater than that of any year since 1930; of lead, since 1918; and of zinc, since 1927. The production for the first 8 months of 1944, although substantially in excess of the total for 1943, shows a leveling off suggesting that the peak has



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[1] Consulting Mining Engineer and Geologist. Oral communication.

been reached. The rate at which the stimulated industry has grown is indicated by the following comparison:

	1942		1943		Jan.-Aug. 1944
	Pounds	Value	Pounds	Value	Pounds
Copper	2,138,149	$258,716	17,172,440	$2,232,417	17,834,000
Lead	10,329,176	692,054	11,811,034	885,827	7,484,000
Zinc	1,275,906	118,659	5,170,627	558,427	10,108,000
Totals		$1,069,429		$3,676,671	

A review of California production since its beginning shows that over 90 percent of the copper has come from Shasta, Plumas, Calaveras and Siskiyou counties; over 90 percent of the lead from Inyo County; and over 90 percent of the zinc from Shasta and Inyo counties.

In 1944 the copper production was mainly from the Dakin (Gray Eagle) in Siskiyou County, the North Keystone in Calaveras, the Hornet in Shasta and the Newton in Amador County.

The principal lead production is from the Columbia No. 2 in the Resting Springs District and the Darwin Group both in Inyo County.

The major zinc producers are the Columbia No. 2 in Inyo, the Blue Moon in Mariposa, and the Penn and Quail Hill in Calaveras County. Eight other mines each produce important amounts.

Copper Production of California, by Years

Year	Pounds	Value	Year	Pounds	Value
1882	826,695	$144,672	1914	30,491,535	$4,055,375
1883	1,600,862	265,743	1915	40,968,966	7,169,567
1884	876,166	120,911	1916	55,809,019	13,729,017
1885	469,028	49,248	1917	48,534,611	13,249,948
1886	430,210	43,021	1918	47,793,046	11,805,883
1887	1,600,000	192,000	1919	22,162,605	4,122,246
1888	1,570,021	235,303	1920	12,947,299	2,382,303
1889	151,505	18,180	1921	12,088,053	1,559,358
1890	23,347	3,502	1922	22,883,987	3,090,582
1891	3,397,405	424,675	1923	28,346,860	4,166,989
1892	2,980,944	342,808	1924	52,089,349	6,823,704
1893	239,682	21,571	1925	46,968,499	6,669,527
1894	738,594	72,486	1926	33,521,544	4,693,014
1895	225,650	21,901	1927	27,350,316	3,582,888
1896	1,992,844	199,599	1928	25,162,304	3,623,360
1897	13,638,626	1,540,666	1929	33,809,258	5,941,799
1898	21,543,229	2,475,168	1930	26,534,752	3,449,522
1899	23,915,486	3,990,534	1931	12,954,842	1,178,890
1900	29,515,512	4,748,242	1932	1,417,536	89,307
1901	34,931,788	5,501,782	1933	992,515	63,521
1902	27,860,162	3,239,975	1934	590,638	47,252
1903	19,113,861	2,520,997	1935	2,031,836	168,645
1904	29,974,154	3,969,995	1936	9,991,799	919,245
1905	16,997,489	2,650,605	1937	10,512,500	1,272,013
1906	28,726,448	5,522,712	1938	1,613,491	158,122
1907	32,602,945	6,341,387	1939	8,390,215	872,582
1908	40,868,772	5,350,777	1940	12,833,363	1,450,170
1909	65,727,736	8,478,142	1941	8,101,449	955,970
1910	53,721,032	6,680,641	1942	2,138,149	258,716
1911	36,838,024	4,604,753	1943	17,172,440	2,232,417
1912	34,169,997	5,638,049			
1913	34,471,118	5,343,023	Totals	1,217,841,108	$190,534,920

Lead Production of California, by Years

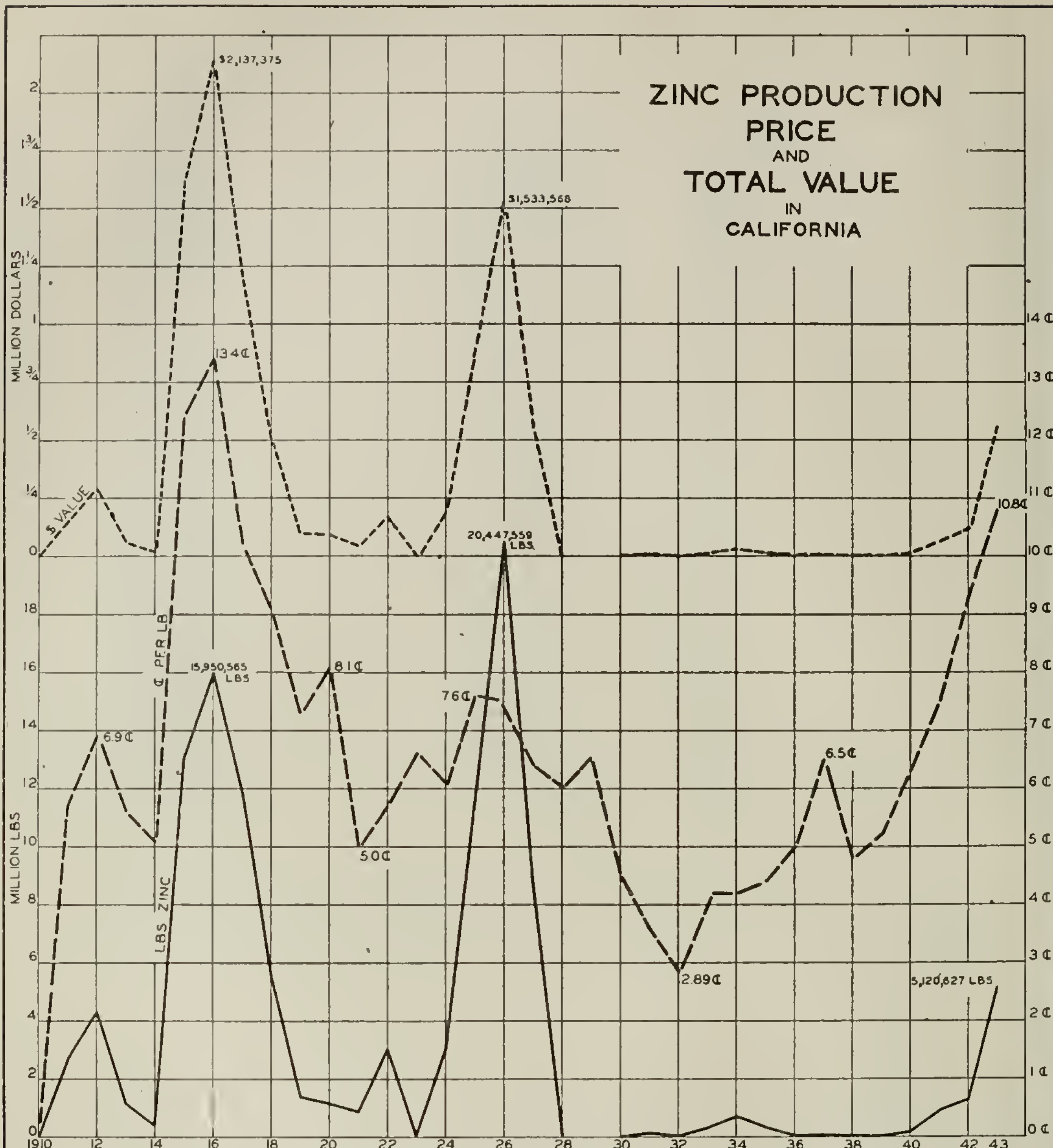
Year	Pounds	Value	Year	Pounds	Value
1877	[a]7,836,000	$391,800	1912	1,370,067	$61,653
1878	8,640,000	328,320	1913	3,640,951	160,202
1879	4,502,000	191,335	1914	4,697,400	183,198
1880	4,200,000	215,460	1915	4,796,299	225,426
1881	6,680,000	325,316	1916	12,392,031	855,049
1882	[b]4,000,000	196,800	1917	21,651,352	1,862,016
1883	[c]3,400,000	145,520	1918	13,464,869	956,006
1884	3,200,000	120,512	1919	4,139,562	219,397
1885	2,000,000	80,900	1920	4,903,738	392,300
1886	2,000,000	93,400	1921	1,149,051	51,707
1887	[d]1,160,000	52,200	1922	6,511,280	358,120
1888	900,000	38,250	1923	9,934,522	695,416
1889	940,000	35,720	1924	4,984,387	398,751
1890	800,000	36,000	1925	7,352,422	639,661
1891	1,140,000	49,020	1926	8,067,873	645,429
1892	1,360,000	54,400	1927	2,748,440	173,151
1893	666,000	24,975	1928	1,882,795	109,102
1894	950,000	28,500	1929	1,428,777	90,014
1895	1,592,400	49,364	1930	3,542,796	176,241
1896	1,293,500	38,805	1931	3,934,240	145,568
1897	596,000	20,264	1932	2,418,626	72,480
1898	655,000	23,907	1933	772,463	28,583
1899	721,000	30,642	1934	804,911	29,655
1900	1,040,000	41,600	1935	1,142,405	45,695
1901	720,500	28,820	1936	1,098,545	50,533
1902	349,440	12,230	1937	2,402,110	141,724
1903	110,000	3,960	1938	1,003,096	46,142
1904	124,000	5,270	1939	1,061,294	49,880
1905	533,680	25,083	1940	3,092,636	154,632
1906	338,718	19,307	1941	6,900,851	393,348
1907	328,681	16,690	1942	10,329,176	692,054
1908	1,124,483	46,663	1943	11,811,034	885,827
1909	2,685,477	144,897			
1910	3,016,902	134,082	Totals	236,437,619	$14,002,145
1911	1,403,839	63,173			

a Quantities for 1877-1881 (inc.) from C. E. Siebenthal, Mineral Resources of U. S. 1912, Part I, U. S. Geol. Survey, p. 339; and values for same years from quotations in Eng. & Min. Jour. of New York.
b Estimated.
c Quantities and values for 1883-1886 (inc.) from Mineral Resources of U. S. Geol. Surv., 1883-1886, respectively.
d Data from 1887 to date from reports of California State Mining Bureau.

Total Zinc Production of California

Total figures for zinc output of the State are as follows, commercial production dating back only to 1906:

Year	Pounds	Value	Year	Pounds	Value
1906	206,000	$12,566	1926	20,447,559	$1,533,568
1907	177,759	10,598	1927	8,625,004	552,000
1908	54,000	3,544	1928		
1909			1929		
1910			1931	149,865	5,314
1911	2,679,842	152,751	1932		
1912	4,331,391	298,866	1933	290,222	12,189
1913	1,157,947	64,845	1934	721,719	31,034
1914	399,641	20,381	1935	328,013	14,432
1915	13,043,411	1,617,383	1936	29,740	1,487
1916	15,950,565	2,137,375	1937	39,643	2,577
1917	11,854,804	1,209,190	1938	17,554	843
1918	5,565,516	506,466	1939	16,390	852
1919	1,384,192	101,046	1940	182,088	11,472
1920	1,188,009	96,229	1941	880,612	66,046
1921	846,184	42,309	1942	1,275,906	118,659
1922	3,034,430	172,963	1943	5,170,627	558,427
1923					
1924	3,060,000	198,900	Totals	114,655,283	$10,431,854
1925	11,546,602	877,542			



Accompanying "Economic Mineral Resources and Production in California," California Division of Mines Bulletin 130

Costs

The base-metal industry of California has shown throughout its history a tendency to lie dormant during times of low or even moderate metal prices and to revive only under conditions of extraordinary price incentive. The principal reason is not far to seek but follows from the fact that California possesses no great base-metal deposits comparable to the copper mines of Utah and Arizona or the lead-zinc mines of Idaho. The near-great Shasta District for a year or so stood second in production of copper only to Michigan and still ranks thirteenth among American copper camps.

The problem of operating high-cost copper mines in California at a price of 12 cents is about as follows:

When copper is quoted at 12 cents laid down as wirebar in New York, a pound of copper disseminated through a 4 percent ore in California mine is worth a great deal less than 12 cents to the mine owner.

As a representative case it may be assumed that the mine in question is complete with mill and produces concentrates containing 24 percent copper. The product must be trucked 50 miles and shipped from a point in Central California to a Utah smelter. Working backward from the New York buyer the original 12 cents would be distributed approximately as follows:

	Costs. Cents per lb.	Value of pound of copper after costs are deducted. Cents per lb.
Value of the pound of copper in New York	----	12.0
Sale, refining, freight from Utah, smelting	3.98	8.02
Freight from California to Utah	1.62	6.40
Trucking concentrates 50 miles	0.40	6 00

These costs over which the California miner has little control have reduced the value of a pound of copper at the mine to about half the quoted value. A ton of 4 percent ore would contain approximately $4.30 in recoverable copper to pay all local operating costs and yield a profit. The condition is generally similar with lead and zinc.

It should be emphasized that many California ores contain from a few cents to several dollars in net recoverable gold and silver. The relative importance of an accessory metal content may be appreciated.

Costs of mining, development and milling vary greatly with such factors as size of operation, system of mining, type of ore and location.

Postwar Outlook

The postwar outlook for California's copper, lead and zinc industries hinges, with few reservations, directly on the future cost of operation and prices of the three metals and to some extent on that of accessory gold and silver.

The war-level of activity in California base metals is the direct result of price levels established by government agencies. The more important mines were under contract to furnish an agreed output during a fixed contract period. In several cases operating arrangements were made on an altogether temporary "war plant" basis, particularly with respect to milling facilities and the development of reserves. Readily available ore has been sought, without ordinary development of further reserves, and costs have been a secondary consideration to the provision of metal for the war effort. Continuation of mining into postwar future would call for expensive development and plant alteration.

Possible Postwar Employment

Nineteen operations have produced over 95 percent of copper, lead and zinc in California during the war period of 1942-1943-1944.

In October, 1944, these with a few newly-started and smaller mines, although short-handed, employed 650 men. At the peak of production in 1943 the total labor force was about 800.

Of 19 operations, 11 expect to close down at the expiration of premium-period contracts under which their output is sold to Metals Reserve Company.

Other operators expect to employ 390 men in postwar operation. Several of these are, however, marginal in character and may be forced to close with any substantial decrease in price or increase in operating cost.

It is estimated that base-metal mines will employ at least 150 men in postwar operations, and this may reach the higher figure. In addition to this the Gray Eagle Mine expects to employ up to 175 men until the end of 1946 when reserves will presumably be exhausted.

References:

Gardner, E. D., Johnson, C. H., Butler, B. S. Copper Mining in North America. U. S. Bur. of Mines. Bull. 405. 1938.

Julihn, C. E. and Horton, F. W., Min. Indust. Sur. of the U. S., Mines of Southern Mother Lode Reg. U. S. Bur. of Mines. Bulletin 413. 1938.

Leith, C. K. and Liddell, D. M. The Mineral Reserves of the U. S. and Its Capacity for Production. Nat. Res. Comm. 1936.

Rand and Sturgis, The Mines Handbook. 1931, p. 495.

Shenon, P. J. Copper Deposits in Southwestern Oregon. U. S. Geol. Sur. Cir. 2, pp. 12-15, 1933.

Merrill, C. W. and Gaylord, H. M. Gold, Silver, Copper, Lead and Zinc in Cal. Minerals Yearbook. U. S. Bur. of Mines. 1939, 40, 41, 42 and 43.

DIATOMITE

California is the most important source of diatomaceous earth, a light, porous, chalk-like material composed of the siliceous remains of microscopical plant and animal life.

By far the largest production in the United States comes from the deposit at Lompoc, Santa Barbara County. The second in importance in California is Los Angeles County. Production in 1943 was from three operations, two in Santa Barbara and one in Los Angeles County.

Other deposits are located in Contra Costa, Fresno, Inyo, Kern, Monterey, Orange, Plumas, San Benito, San Bernardino, San Joaquin, San Luis Obispo, Shasta, Sonoma and Tehama counties.

Uses

Distribution of uses for diatomite are about as follows:

Filtration	50	percent
Insulation	25	"
Fillers	20	"
Miscellaneous	5	"

Prices

Oil, Paint and Drug Reporter, Oct. 2, 1944:

Nat. bgs. C/L Pacific Coast	$22-$25 per ton
Purified, Atlantic Coast	$55-$59 per ton
Mexican, white, bags, Atlantic Coast	2¢-3¢ per lb.

E. & M. J. Metal & Mineral Markets, No. 2, 1944:

F.O.B. Mill, Nevada-Crude, bulk, dried ---------- $7 per ton nominal

The freight rate from California ports to Atlantic Coast is $14 per ton.

Character and Extent of Reserves

Reserves of the principal producers are extensive and even with the rapidly expanding markets are estimated to be sufficient to maintain production for over 50 years.

Production

Annual production during the past 10 years has averaged in excess of 100,000 tons per year. During the years 1941-1943 inclusive, operations were at an accelerated rate with an average annual output of 141,915 tons per year.

While there is scattered production from small operations, the bulk of output comes from two properties, in Santa Barbara and Los Angeles counties respectively.

Total Production of Diatomite in California, by Years

Year	Tons	Value	Year	Tons	Value
1889	39	$1,335	1920	60,764	$1,056,675
1890			1921		
1893	50	2,000	1922	90,739	1,016,675
1894	51	2,040	1923		
1895			1924	193,064	5,729,736
1897	5	200	1925		
1898			1926		
1902	422	2,532	1927	275,403	1,995,923
1903	2,703	16,015	1928		
1904	6,950	112,282	1929		
1905	3,000	15,000	1930	300,017	4,848,661
1906	2,430	14,400	1931		
1907	2,531	28,948	1932		
1908	2,950	32,012	1933	203,228	3,104,154
1909	500	3,500	1934		
1910	1,843	17,617	1935		
1911	2,194	19,670	1936	290,908	4,243,572
1912	4,129	17,074	1937		
1913	8,645	35,968	1938		
1914	12,840	80,350	1939	266,358	3,941,941
1915	12,400	62,000	1940		
1916	15,322	80,649	1941		
1917	24,301	127,510	1942	425,745	6,692,051
1918	35,963	189,459	1943		
1919	40,200	217,800	Totals	2,285,694	$33,567,549

Postwar Outlook. Employment

Markets for diatomite are expanding rapidly in part by research in new uses and in part by increased demand in existing uses.

New uses include military and industrial water filtration, in paper manufacture and in paint where it is used as a flatting agent.

Producers estimate that postwar requirements are expected to be 50 to 60 percent higher than formerly.

Plant expansion is planned including shops and warehouse facilities.

The industry employs several hundred men in mining and processing operations. Postwar estimates indicate that 700 to 800 men may be needed.

References:

Mining and Processing of Diatomite. Chem. & Met. Eng. Aug. 1942.

Diatomite: Mineral Abstracts. Cal. Div. of Mines. Unpublished.

Industrial Minerals and Rocks. A. I. M. E. 1937.

FELDSPAR

Feldspar is a name applied to a group of rocks of varying composition, containing alumina, silica, potash, soda and other alkalis. As produced they all contain some impurities such as mica, garnet, tourmaline and quartz. Specifications usually limit the amount of free quartz, the amount permitted varying from 5 to 20 percent. Impurities are usually sorted out as completely as possible by hand. Substantial deposits have been found in Fresno, Inyo, Kern, Los Angeles, Mariposa, Monterey, Riverside, San Bernardino and San Diego counties. Production has come largely from the southern part of the State, particularly San Bernardino and San Diego counties.

Uses. Markets

About 60 percent of feldspar produced in the United States is used in the manufacture of glass, 32 percent in pottery, 4 or 5 percent in enamelware, and the remainder in soaps, abrasives and minor uses.

In California, however, the principal uses are in pottery and enamelware, with glass ranking third.

Ninety percent or more of the production in California is "captive" tonnage, being produced by consuming manufacturers. Some is sold for abrasive purposes, but there is little open market for independent producers.

Prices

There are no open market quotations on feldspar. The average value at the mine reported by producers in 1941-1943 inclusive was $4.90 per ton.

The import duty on feldspar is 25¢ per ton for crude.

Character and Extent of Reserves

Feldspar is one of the most abundant rocks, but much of it is too disseminated in other rock material to be separately mined. Deposits of commercial value are limited to pegmatite areas. Their value when found is dependent largely on chemical analysis and freedom from iron-bearing associated minerals such as biotite mica, tourmaline and garnet. Reserves of feldspar are large but there is little information available as to what portion is suitable for glass and ceramic uses.

Production

During the ten years prior to 1943, annual production has amounted to 1,400 to 5,000 tons with an average of 3,200 tons per year. In 1943 about the average amount was produced. In addition to this, feldspathic sand produced in Riverside County supplies much of the requirements of the glass industry of southern California.

Production of Feldspar in California, by Years

Year	Tons	Value	Year	Tons	Value
1910	760	$5,720	1928	14,628	$93,745
1911	740	4,560	1929	13,327	78,404
1912	1,382	6,180	1930	5,014	35,654
1913	2,129	7,850	1931	4,895	59,921
1914	3,530	16,565	1932	2,294	15,988
1915	1,800	9,000	1933	-------	-------
1916	2,630	14,350	1934	2,655	30,611
1917	11,792	46,411	1935	3,265	21,855
1918	4,132	22,061	1936	3,430	24,959
1919	1,272	12,965	1937	2,868	10,930
1920	4,518	26,189	1938	1,378	6,970
1921	4,349	28,343	1939	2,076	12,510
1922	4,587	37,109	1940	3,022	16,644
1923	11,100	81,800	1941	-------	-------
1924	9,055	68,112	1942	10,040	56,718
1925	8,165	59,615			
1926	7,300	56,400	Totals	159,773	$1,054,245
1927	10,932	86,101			

Postwar Outlook. Employment

About 15 men were employed in mining and grinding operations in 1943, and most of the tonnage mined was for ceramic use. In peacetime considerable feldspar is used in the manufacture of enameled metalware and sanitary products and that outlet is largely closed by the lack of steel.

The postwar resumption of manufacturing of these goods will call for increased supplies, but the tonnage requirements for feldspar are small.

Postwar employment is estimated at 25 men.

References:

Twenty Seventh Rept. State Mineral. Calif. Div. of Mines, 1931.

Ind. Minerals and Rocks. A. I. M. E. 1937.

Bowles, Oliver and Lee, C. V., U. S. Bur. of Mines Inf. Cir. 6381. 1930.

Commercial Standard. C. S. 23-30. U. S. Bur. of Standards 1930. Supt. of Documents, 5 cents.

GARNET (Abrasive)

Many deposits of garnet occur in various parts of California and are associated with some of the tungsten deposits in Inyo and Kern Counties as gangue material.

The first commercial production was made in 1938 by one of the tungsten mills near Bishop, Inyo County, garnet being recovered as a by-product in the treatment of tungsten ores. The product is recovered

as a graded sand and used largely by the aircraft industry as an abrasive. The product is sold for $15 to $20 per ton.

While output is relatively small, reserves of raw material are substantial.

Its potential importance warrants a study of preparation and markets.

Reference:

Industrial Minerals and Rocks. A. I. M. E. 1937.

GOLD

By G. A. Joslin [1]

Gold was first discovered in California at Newhall, in Los Angeles County, in 1841 but it was not until James W. Marshall found gold on the American River, in 1848, that gold became important in the economy of the State. Although it was nearly a year before the report gained credence and the westward rush began, gold mining soon hit its stride; in 1852 the output amounted to nearly four million ounces—over 60 per cent of the world production for that year—a record that has not been equalled since. The effect of this tremendous production upon the United States and its accelerating influence upon the development of California is well known. Although the value of the annual production declined to less than twenty million dollars in the late 1860's, gold still held first place in the metal production of the State until 1943 when the War Production Board's Order L-208, of October 8, 1942, drastically curtailed further mining. In 1939 the value of the gold production was 14.3 per cent of the total mineral production of the State and 47.2 per cent after excluding petroleum and natural gas.

Table No. 1 gives the total production by years from 1848 to 1943, inclusive. Figures for the years 1848 to 1902 were compiled by Charles G. Yale, of the Division of Mineral Resources of the U. S. Geological Survey, and for a number of years statistician of the California State Mining Bureau and of the U. S. Mint at San Francisco. From 1902 to 1923 (inclusive) they were collected by the U. S. Geological Survey and since 1923 they have been assembled by the U. S. Bureau of Mines. From 1848 through 1882 annual totals are for fiscal years; for subsequent years they are on a calendar-year basis. The adjustment made in 1883 accounts for the apparent jump in production for that year. There is no dependable record of production before 1848, a matter of slight consequence since the amount was negligible.

In Figure No. 1 the gold production of California is shown graphically. Table No. 1 furnishes the data for the curve of Total Production. Prior to 1900 placer and lode mining were not classified separately. In 1920, however, Charles G. Yale [2] made an estimate of the relative yields of placer and lode mines by decades from 1848 to 1900. His figures, which are given in Table No. 3, have been used in plotting the curves for

[1] Consulting Mining Engineer, Los Angeles.

[2] Historical Summary of Gold, Silver, Copper, Lead and Zinc Productions in California 1848-1926. U. S. Bureau of Mines, Economic Paper 3. 1929.

this period. Since 1901, production records of lode and placer mining have been compiled separately and placer mining has been further broken down into classes of mining and methods of recovery.

The figures for 1903-1923 (inclusive) are those prepared by the U. S. Geological Survey; and since by the U. S. Bureau of Mines:

TABLE No. 1

Total Gold Production of California, 1848 to 1943

Year	Fine ounces	Value	Year	Fine ounces	Value
1848	11,866	$245,301	1897	767,779	$15,871,401
1849	491,072	10,151,360	1898	769,476	15,906,478
1850	1,996,586	41,273,106	1899	741,881	15,336,031
1851	3,673,512	75,938,232	1900	767,390	15,863,355
1852	3,932,631	81,294,700	1901	821,845	16,989,044
1853	3,270,803	67,613,487	1902	818,037	16,910,320
1854	3,358,867	69,433,931	1903	788,544	16,300,653
1855	2,684,106	55,485,395	1904	901,484	18,633,676
1856	2,782,018	57,509,411	1905	914,217	18,898,545
1857	2,110,513	43,628,172	1906	906,182	18,732,452
1858	2,253,846	46,591,140	1907	809,214	16,727,928
1859	2,217,829	45,846,599	1908	907,590	18,761,559
1860	2,133,104	44,095,163	1909	979,007	20,237,870
1861	2,026,187	41,884,995	1910	953,734	19,715,440
1862	1,879,595	38,854,668	1911	954,870	19,738,908
1863	1,136,897	23,501,736	1912	953,640	19,713,478
1864	1,164,455	24,071,423	1913	987,187	20,406,958
1865	867,405	17,930,858	1914	999,113	20,653,496
1866	828,367	17,123,867	1915	1,085,646	22,442,296
1867	883,591	18,265,452	1916	1,035,745	21,410,741
1868	849,265	17,555,867	1917	971,733	20,087,504
1869	881,830	18,229,044	1918	799,588	16,528,953
1870	844,537	17,458,133	1919	807,667	16,695,955
1871	845,493	17,477,885	1920	692,297	14,311,043
1872	748,951	15,482,194	1921	759,721	15,704,822
1873	726,554	15,019,210	1922	709,678	14,670,346
1874	835,186	17,264,836	1923	647,210	13,379,013
1875	816,377	16,876,009	1924	636,140	13,150,175
1876	755,169	15,610,723	1925	632,035	13,065,330
1877	798,249	16,501,268	1926	576,798	11,923,481
1878	911,343	18,839,141	1927	564,586	11,671,018
1879	949,439	19,626,654	1928	521,740	10,785,315
1880	968,986	20,030,761	1929	412,479	8,526,703
1881	929,920	19,223,155	1930	457,200	9,451,162
1882	829,458	17,146,416	1931	523,135	10,814,162
1883	1,176,329	24,316,873	1932	569,167	11,765,726
1884	657,900	13,600,000	1933	[a]613,579	15,683,075
1885	612,478	12,661,044	1934	[b]719,064	25,131,284
1886	711,911	14,716,506	1935	[c]890,430	31,165,050
1887	657,349	13,588,614	1936	1,077,442	37,710,470
1888	616,000	12,750,000	1937	1,174,578	41,110,230
1889	542,425	11,212,913	1938	1,311,129	45,889,515
1890	595,486	12,309,793	1939	1,435,264	50,234,240
1891	615,759	12,728,869	1940	1,455,671	50,948,485
1892	608,166	12,571,900	1941	1,408,793	49,307,755
1893	606,564	12,538,780	1942	847,997	29,679,895
1894	670,636	13,863,282	1943	148,328	5,191,480
1895	741,798	15,334,317			
1896	831,158	17,181,562	Totals	101,263,996	$2,246,287,561

[a] Value calculated at an average weighted price of $25.56 per fine ounce; previously $20.6718.
[b] Value calculated at an average weighted price of $34.95 per fine ounce.
[c] Value $35 per fine ounce beginning 1935.

As shown in Table No. 1, and as illustrated graphically in Figure No. 1, in 1929 and again in 1930 the value of the annual gold production dropped below ten million dollars for the first time since 1849. The year 1929 was the turning point, however, for in that year began a rise which, accelerated by the increase in the price for gold in 1933 and the fixed price of $35 an ounce in 1934, brought forth over one

TABLE No. 2

California Mines Production (fine ounces) by Months 1939-44

Month	1939*	1940*	1941*	1942*	1943*	1944†
January	106,362	128,127	129,894	101,698	16,425	10,011
February	112,497	112,536	123,735	91,945	8,547	8,596
March	116,171	120,596	120,462	95,344	14,440	9,908
April	113,587	119,063	129,664	92,652	12,461	9,479
May	124,682	127,467	121,231	87,037	13,424	9,812
June	122,306	130,111	118,462	84,016	15,552	9,772
July	122,672	91,678	120,089	70,002	12,910	9,578
August	113,185	110,666	118,379	64,615	12,759	8,993
September	122,506	105,443	108,430	56,108	10,501	----------
October	125,713	124,085	111,658	56,502	11,411	----------
November	128,273	136,181	101,591	27,919	10,074	----------
December	127,310	149,718	105,198	20,159	9,824	----------
Totals	1,435,264	1,455,671	1,408,793	847,997	148,328	----------

* Minerals Yearbook Review of 1943, page 5.
† Figures furnished by Charles W. Merrill, Supervising Engineer, U. S. Bureau of Mines, San Francisco, California.

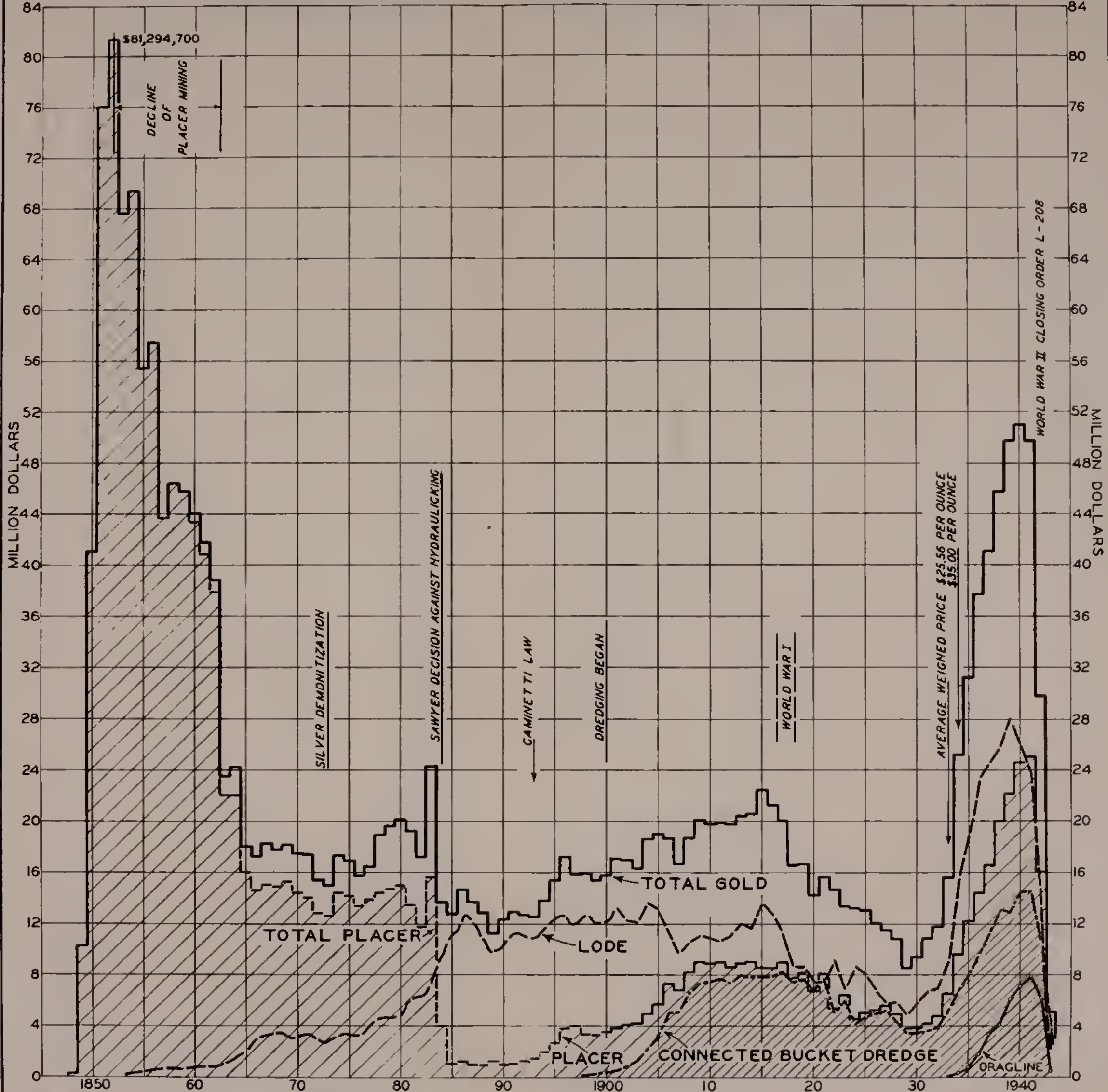
million ounces in 1936 and culminated in 1940 with an output greater than in any year since 1862 and a value not exceeded since 1856. Production from lode mines was undoubtedly the largest in the history of the State. The Minerals Yearbook of the U. S. Bureau of Mines for 1943 states:

> "In 1941, however, a reaction set in which gained headway in 1942. By January 1943 monthly production had sunk to 16,425 ounces and thereafter it fluctuated between that figure and a low of 8,547 ounces established in February. The year ended with an output of 9,824 ounces in December, second-lowest month of the year. Compared with 1942 the decrease of 699,999 ounces ($24,-488,415) recorded in 1943 was greater in both quantity and value than that between any other 2 years in the State's history, not excluding 1852-53, 1854-55, and 1856-57, when flush placer output was failing; 1883-84, when the Sawyer Decision drastically reduced hydraulicking; and 1917-18, when World War I caused many operations to suspend or curtail output."

The same publication comments on the figures given in Table No. 2, as follows:

> "The uninterrupted upward trend shown in the annual figures beginning in 1929 and culminating in 1940 is paralleled in the available monthly data. It will be noted, however, that a serious recession was experienced in July 1940 from which the industry did not fully recover until November. This was caused by a labor strike at the Selby smelter and refinery of the American Smelting & Refining Co., which resulted in the postponement of many shipments of ore, concentrates, and bullion; the strike was called July 1, and work was resumed November 9. The peak reached in December 1940 may be attributed, at least in part, to the movement of material accumulated during the strike. Beginning with January

GOLD RECOVERY IN CALIFORNIA IN DOLLARS



1941, however, the trend is unmistakably downward, and the rate of decline accelerates as the months pass. The downward plunge is arrested in October 1942 probably because many operations, closed by War Production Board Order L-208, made final clean-ups, which were shipped before the end of the month. At any rate, the decline in November and December put the curve back on the precipitous trend line shown during the few months preceding October. By January production had reached a level that permitted but little further recession."

The accuracy of the prediction in the last sentence is shown by the figures for 1944; monthly production still hovers around 9,000 ounces. This represents the output permitted by the War Production Board. It is at the rate of 114,000 ounces a year, the lowest since 1849.

Figure No. 1 illustrates the many changes in the industry. From a negligible production in 1848 the output of the rich and virgin placers jumped to over eighty million dollars in 1852. The cream was skimmed quickly; by 1865 production had dropped to under eighteen million dollars. In 1884 the California farmers, who had long protested the choking of stream beds with the spoil from the hydraulic mines, finally succeeded in obtaining a court decree known as the Sawyer Decision, which prohibited the dumping of debris in the Sacramento and San Joaquin Rivers and their tributaries. As nearly all of the hydraulic mines of the State were situated in the drainage basins of these streams, very little gold was produced by hydraulic mining after the Sawyer Decision became effective. Placer production, which up to this time had been furnished almost entirely by hydraulic mining, fell off to not over ten per cent of the total gold output of the State. In 1893, the Caminetti Law created the California Debris Commission, empowered to assess 3 per cent of the gross output of the hydraulic mines operating under its jurisdiction, and, out of the funds, build storage dams for the impounding of debris. This was expected to re-open the hydraulic mines but it was soon found that the sums assessable were inadequate; in fact they were never collected. Hydraulic mining has not been important since 1884.

TABLE No. 3

California Lode and Placer Production by Decades, 1848-1901 *

Years	Placer	Lode	Total
1848-50	$51,669,767		[1]$51,669,767
1851-60	581,561,868	$5,874,362	[2]587,436,230
1861-70	211,388,439	23,487,604	[3]234,876,043
1871-80	120,910,077	51,818,604	[4]172,728,681
1881-90	37,881,328	113,643,986	[5]151,525,314
1891-1900	29,416,001	117,664,005	[6]147,080,006

* From U. S. Bureau of Mines Econ. Paper 3.
[1] Estimated as 100 per cent from placer mines.
[2] Estimated as 99 per cent from placer mines and 1 per cent from lode mines.
[3] Estimated as 90 per cent from placer mines and 10 per cent from lode mines.
[4] Estimated as 70 per cent from placer mines and 30 per cent from lode mines.
[5] Estimated as 25 per cent from placer mines and 75 per cent from lode mines.
[6] Estimated as 20 per cent from placer mines and 80 per cent from lode mines.

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From Figure No. 1 and also from Table No. 3 it will be noted that lode mining started in a small way in the 1850's but did not gain ascendancy until after the Sawyer Decision. From that time it held a lead over placer mining that was undisputed until 1918 when, due to the increasing production of dredging, which began in 1898, the gap between the two classes of mining became very narrow indeed. In 1921 placer production exceeded lode production by 29,259 ounces ($604,826) and again in 1927 by 174 ounces ($3,608). In 1941, 1942, and 1943 the placer mines furnished 51 per cent, 55 per cent, and 60 per cent of the total production of the State. In 1943 the placer-lode ratio was the highest since 1884. The gain by the placers in the 1940's may be ascribed to the rapid strides made by the drag line dredges and the non-floating type of washing plants, which came into use in 1934; to the greater loss of men to the war industries suffered by lode mines; and finally, to the Closing Order L-208 which closed most of the lode mines but permitted a few placer mines to continue.

The Total Production curve of the chart shows the long swing cycles. The first slump occurs in 1873, occasioned by the falling off of flush placer production and accentuated perhaps by the demonetization of silver which, since all gold ore contains a certain amount of silver, doubtless had its effect. Or, if the curve be corrected by flattening out the high peak of 1883, which as has been noted, is due to giving that year the production from July 1, 1882 until December 31, 1883, for the purpose of bringing all accountings to a calendar-year basis, it would show the first real trough in 1890, a trough occasioned by the influences mentioned plus the Sawyer Decision. Between 1905 and 1915 there was a slump in lode mine production. The recession was not reflected in the total production of the State, however, because the introduction of connected-bucket dredges gave a boost to placer mining that offset the decline of the quartz mine. Beginning in 1915 production declined. Rising costs, caused by the increase of wages and commodity prices resulting from World War I retarded all classes of mining. In 1929 the decline was arrested.

Table No. 4 gives the total production by counties from 1880 to 1943. Prior to 1880 the production by counties is not known as no segregation was made in statistical records. In 1894 the California State Mining Bureau began collecting detailed statistics on gold but since 1923 the information used in State statistics has been assembled by the U. S. Bureau of Mines. The table illustrates the wide spread occurrence of gold in California; gold has been produced in 50 of the 58 counties. Even in 1939, 43 counties held a place on the list. Of the total production from 1880 to 1943, 15 counties produced 88 per cent; three counties, Nevada, Amador and Yuba, furnished over $100,000,000 each, or 39 per cent of the total. According to a report of the California Gold Mining Industry made by the California Chapter of the American Mining Congress in 1942, gold mining constitutes the sole or major basis for the economic support of 19 counties.

TABLE No. 4

Total Gold Production by Counties, 1880-1943 *

County	Gold production	County	Gold production
Alameda	----------	Sacramento	$94,624,574
Alpine	$143,955	San Benito	----------
Amador	139,869,641	San Bernardino	11,514,258
Butte	68,850,503	San Diego	[2]7,452,277
Calaveras	76,984,553	San Francisco	[2]13,455
Colusa	[1]109,344	San Luis Obispo	[2]140
Contra Costa	102,036	San Mateo	----------
Del Norte	925,102	Santa Barbara	[2]75,000
El Dorado	30,224,641	Santa Cruz	[2]2,454
Fresno	2,586,853	Santa Clara	[2]35
Glenn	----------	Shasta	[2]44,572,712
Humboldt	2,963,598	Sierra	52,814,732
Imperial	2,449,191	San Joaquin	[1,2]2,407,320
Inyo	11,521,733	Siskiyou	37,869,340
Kern	44,838,879	Solano	----------
Kings	777	Sonoma	----------
Lake	[2]65	Stanislaus	[2]9,862,567
Lassen	1,407,391	Sutter	----------
Los Angeles	[2]2,222,639	Tehama	[2]54,998
Madera	1,717,843	Trinity	43,099,973
Marin	----------	Tulare	425,628
Mariposa	22,390,427	Tuolumne	44,157,708
Mendocino	[2]3,531	Ventura	43,666
Merced	15,021,118	Yolo	2,350
Modoc	[2]288,017	Yuba	102,356,797
Mono	24,716,918	Unapportioned	12,760,062
Monterey	98,447		
Napa	[1,2]685,401	Total 1880-1943, inclusive	$1,219,607,601
Nevada	229,099,345		
Orange	[2]38,298	Total 1848-1879, inclusive	1,026,679,960
Placer	45,401,928		
Plumas	28,220,193	Total 1848-1943, inclusive	$2,246,287,561
Riverside	2,615,188		

* From Bulletin No. 122 (1942) of the Division of Mines, and Minerals Yearbooks for 1942 and 1943 of the U. S. Bureau of Mines. Prior to 1880 production was not segregated by counties.

[1] Includes silver.

[2] Plus unapportioned. Where publishing of complete data would disclose the production of a single producer in the county the out-put is included in "Unapportioned."

The annual reports of California Mineral Production issued by the Division of Mines give the number of producing mines as listed below. The figures are exclusive of prospectors, snipers, highgraders, and others who gave no evidence of legal right to property.

Number of Producing Gold Mines in California, 1929-1943.

Year	Lode mines	Placer mines	Total
1929	324	474	798
1930	481	892	1,373
1931	462	497	959
1932	718	828	1,546
1933	797	993	1,790
1934	867	1,784	2,651
1935	1,112	1,487	2,609
1936	903	639	1,642
1937	913	838	1,751
1938	927	676	1,603
1939	1,028	749	1,777
1940	1,030	836	1,866
1941	835	724	1,559
1942	434	428	862
1943	139	82	221

Uses

The chief function of gold is as a monetary metal. Since the hoarding and possession of gold was prohibited in 1933 the metal has not circulated freely as currency. It has continued to serve, however, in the settlement of international debts and, in that sense at least, is still considered as international money. Although our currency is not tied legally to our gold reserve, the gold in the possession of the Government influences the value of our national money. The possession of gold is a national asset and confidence in the credit and the money of a nation is still related to the strength of its gold reserve. It is not the purpose of this chapter to discuss questions of monetary policy but one of the recommendations made to the governors of the eleven Western States and South Dakota by the appointees to the conference in San Francisco in August 1944 was as follows:

> "We advocate the use of gold and silver in the International Fund and also in the International Bank, proposed at the Bretton Woods Conference of 44 nations, or in any other International Monetary Program. We believe that the American people are in favor of a sound monetary system, safeguarding their interests against paper inflation. Printing press currency is not desired by the average American, nor does he want the currency of the United States debased by any international group of 'experts.'
>
> "Experience of the world with greenbacks after the Civil War, and with worthless German marks after World War I, was disastrous and caused a lack of confidence in any 'managed currency' plan."

Although gold serves chiefly as a monetary metal large quantities are employed in industrial use. From 1905-33 the apparent net consumption (the excess of issues for industrial use over the amounts reclaimed and recovered) averaged over $27,000,000 per year, totaling $798,928,058 for the period, or over 40 per cent of the nearly two billion dollar production in the United States.

The peculiar properties of gold, such as resistance to ordinary corrosion, and malleability, make it especially adaptable for certain uses in the trades and arts. In addition to its use in the manufacture of jewelry and in dentistry the metal is used in gilding and plating, in decorating ceramic ware, in chemical and laboratory ware, as an alloy in thermo-electrical instruments, etc.

Markets

The market for gold has been unlimited. Prior to April 1933 gold producers could sell their product to any purchaser but since that time the disposal of all gold produced in the United States has been under the control of the United States Mint. Gold may be sold only to the Mint, to smelters, to assayers who are licensed gold-buyers, and, in restricted amounts, to manufacturing jewelers who are licensed by the Mint. Smelters and assayers, acting as agents for the Mint, may sell direct to the licensed manufacturing jewelers, or to the Mint.

At present it is reported that gold commands a premium over $35 an ounce in North Africa, India, and Asia Minor. It is also reported that mines of the British Dominion and of some other countries are selling

gold in these markets. The delegates to the conference held in San Francisco in August, 1944, suggested to the Governors of the eleven Western States and South Dakota that the President: "—— be memorialized to take such steps and enter in such negotiations as will make free markets for gold in foreign countries available to American gold producers, and will remove current legal restrictions on the export of newly mined gold to such markets by American producers."

The Price of Gold

Gold has had an unlimited market and, at least over long periods, its price is fixed. These characteristics, peculiar to the gold mining industry, because they apply to no other metal—if silver is excepted—set gold mining apart from the mining of other metals or minerals. They are factors that must be considered in any discussion of prices and costs.

From 1834 to 1934 the price of gold in the United States was fixed by Congress at the equivalent of $20.67 per ounce. This was an arbitrary figure; it had no relation to the cost of production. In 1933 the United States, following the actions of Great Britain and other nations, went off the gold standard. For several months there were no official transactions until, in the fall of 1933, the U. S. Treasury began to buy gold, daily fixing the price it would pay. The price rose a little each day. Finally, in January, 1934, the price was pegged at $35 per ounce, where it has remained since. Again, the price is arbitrary.

The cost of producing an ounce of gold is affected by many factors inherent in the exploitation of a wasting natural asset. As lode mines go deeper or enter leaner ore, as placer mines aproach the limits of the gold bearing gravels, costs per ounce rise. This is not all. In a period of low commodity prices, when the purchasing power of gold is high, gold mining enjoys lower costs, and a relatively higher selling price for its product. Like an eddy it runs counter to the main current. It is for this reason that the broker speaks of gold as a "Depression Stock" or a "Hedge against deflation," meaning that the operation of a gold mine is more profitable when gold will purchase more goods and when the labor and supply cost of production becomes less. In a period of high prices, when the purchasing power of gold becomes less and less, the gold miner faces higher production costs and a relatively lower price for his product. If, in such a period he is forced to dig deeper for his ore or to mine the leaner ore of an exhausting ore-body, he is in a serious way indeed.

The California gold industry, in common with gold mining over the world, suffered such a period from 1915 to 1930. The costs of labor and supplies were rising steadily and although several Mother Lode mines were reopened and important quantities of rich ore brought in, their production was not sufficient to overcome the general trend; production declined steadily. This decline is shown in the production curves in Figure I and also in the figures of Table No. 5. Referring to a portion of this table, (years 1913-26) published in Professional Paper 157, [1] Knopf says: "The striking features shown are the severe decline

[1] Knopf, Adolph. The Mother Lode System of California. U. S. Geol. Surv. Prof. Pr. 157. 1929.

in tonnage of ore mined and the increase in the average content from $4 to $7 per ton. This increase is very closely proportional to the decrease in the purchasing power of gold, which has forced those mines that were operating on $2 to $3 ore to shut down.'' In other words, as costs increased the mines that could select higher grade ores were forced to do so and the mines that could not improve the tenor of the ore had to quit. Much of the ore that was profitable in 1913 was not commercial in 1926, or in 1939 for that matter.

TABLE No. 5

Gold and Silver Out-put of Mother Lode Counties, 1913-1938 †

Year	Ore treated at gold milling plants (Short tons)	Value of metals recovered*	
		Total	Average per ton of ore
1913	1,242,343	$4,728,450	$3 81
1914	1,243,529	5,075,522	4 08
1915	1,521,847	6,349,772	4 17
1916	1,393,788	5,853,618	4 20
1917	1,236,903	5,130,682	4 15
1918	845,802	4,334,061	4 27
1919	780,673	4,894,839	6 27
1920	440,516	3,460,423	7 85
1921	540,541	3,720,531	6 88
1922	566,494	3,730,314	6 58
1923	402,133	3,142,529	6 77
1924	476,949	3,337,949	7 00
1925	437,409	3,137,150	7 17
1926	410,243	3,048,784	7 43
1927	302,007	2,287,579	7 57
1928	319,553	2,478,960	7 76
1929	230,389	1,746,325	7 58
1930	261,538	1,902,687	7 27
1931	254,111	1,724,376	6 79
1932	243,104	[1]1,647,462	[1]6 78
1933	290,833	[2]2,313,275	[2]7 95
1934	641,862	[3]4,078,152	[3]6 35
1935	813,074	[4]4,298,561	[4]5 29
1936	887,305	5,298,417	5 97
1937	1,064,908	5,209,943	4 89
1938	931,652	5,713,543	6 13
1939[5]	-------	-------	-------

† From Minerals Yearbooks of the U. S. Bureau of Mines.
* The silver content of these ores averages from less than 2¢ to about 6¢ per ton with silver at 28¢ to $1.00 per ounce.
[1] To 1933 value calculated at 20.67 an ounce.
[2] 1933 value calculated at average weighted price of $25.56.
[3] 1934 value calculated at average weighted price of $34.95.
[4] Beginning 1935, $35.00 per ounce.
[5] Data not compiled after 1938.

The revaluation gave rise to some popular misconceptions as to its effect and real significance. Many people assumed that an increase of practically 75 per cent in the selling price would be reflected immediately in an additional profit to the miner of $15 per ounce; that, for example, a mine producing ore averaging one ounce per ton at a profit of $3 per ton with gold at $20.67 would make a profit of $17.33 with gold at $35.

Paradoxical as it may seem it did not always work out that way. Revaluation increased the value of the ore that was already profitable and it gave value to some of the rock in the mine that could not yield a profit with gold at $20.67 per ounce. Thus, it increased the total amount of gold that could be recovered at a profit, and it increased the total tonnage of ore that could be mined at a profit, but it decreased the average gold content per ton. After revaluation the tendency was to mine ore of lower grade than formerly, leaving for the future some of the advantage gained by the sudden increase in tonnage and in total gold content,

thereby increasing the life of the mine. In the example cited, if the mine continued to produce one-ounce ore the increase in profit per ton would have been $14.33 and the total profit $17.33. If, however, the mine pursued the general policy of the industry and took advantage of the opportunity to mine lower grade ore, which was unprofitable with gold at $20.67, and by so doing brought the average recovery down to, say, 0.59 ounces (or $20.67) per ton, the profit *per ton* treated would be the same; the profit *per ounce* would have increased from $3 to $5.05 but not to $17.33.

Table No. 6 shows the effect of revaluation upon the average grade of ore mined in California during these transition years. The figures include certain amounts of tailings retreated, so the averages do not represent accurately the grade of newly mined ore but these inclusions do not alter the fact that lower grade ore was mined; rather they serve to illustrate that material too low in grade to treat in terms of $20 gold became valuable after the price was increased. The table illustrates the fact that the increase in the price of gold made it possible to mine ore of lower grade but of the same value per ton as before. In 1934 the average recovery was less than one-fifth of an ounce per ton yet the value per ton of the ore treated was about the same as in 1931-32 when the average recovery was one-third of an ounce per ton. After revaluation, the tonnage treated increased rapidly, not only because gold mining became more profitable but also because larger tonnages of profitable ore were available. As tonnage increased the grade of the ore and the average recovered value per ton decreasd. Since the recovered value represents the gross return which has to cover the major item of costs and the lesser item of profit, a decrease in recovered value marks a decrease in production costs. So, as the recovered value decreased, production costs decreased. Costs were decreased by the greater efficiency of mines operating at full capacity. To most of the mines the augmented ore reserves, resulting from revaluation, promised a longer life. For many of them the productive life was increased sufficiently to warrant capital outlays for improvements that increased recoveries and lowered costs.

TABLE No. 6

Lode Mine Production

California Gold and Gold-Silver ore treated by years

Tonnage, fine ounces recovered, and average per ton *

Year	Ore treated, tons	Ounces recovered	Average per ton of ore treated	
			Ounces	Value
1916	2,192,013	574,300	0.262	$5 41 (@ $20 67)
1929	548,564	202,574	0.369	7 63 (@ 20 67)
1931	1,004,229	311,623	0.31	6.40 (@ 20 67)
1932	967,742	329,873	0.34	7 03 (@ 20 67)
1933	1,281,821	350,752	0.274	7 00 (@ 25 56)
1934	2,297,610	443,833	0.193	6 64 (@ 35 00)
1935	3,222,124	539,369	0.167	5 85 (@ 35 00)
1936	4,151,500	653,613	0.157	5 50 (@ 35 00)
1937	4,416,242	682,419	0.151	5 29 (@ 35 00)
1938	4,580,660	735,752	0.160	5 60 (@ 35 00)
1939	5,205,222	786,087	0.151	5 29 (@ 35 00)
1940	4,204,097	731,914	0.172	6 02 (@ 35 00)
1941	3,966,021	675,102	170	5 95 (@ 35 00)

* From Minerals Yearbooks of the U. S. Bureau of Mines.

Large deposits of low-grade ore, formerly unprofitable, were mined. Some of these were so low in grade and the profit per ton so small that operations were profitable only when conducted on a large scale. The contribution of these low-grade mines increased the total tonnage and brought down the average grade in the totals of lode mine production. In 1939 the tonnage treated was the largest in many years and the average grade of the ore was at the low point for this period.

The period of falling commodity prices ushered in by the beginning of the depression in 1930 gave an impetus to the production of gold. This movement gained great momentum with the price increase in 1933. The two accelerating forces were cumulative. Both were, in effect, a revaluation of gold; both increased its purchasing power.

The revaluation had these results:

(1) It increased the ore reserves of many mines by giving value to ores that were formerly too low grade to yield a profit.
(2) It gave value to some of the formerly unprofitable ore left in abandoned mines.
(3) It made possible the opening of new mines and the successful exploitation of known orebodies that were not commercial with gold at $20.67.
(4) It gave value to refractory ore formerly unworkable because of expensive treatment or low recoveries.
(5) It made possible the retreatment of old tailing dumps, slag piles, and in some cases old waste dumps.
(6) It stimulated prospecting and the development of prospects; important new orebodies were discovered.

Any cycle runs its course and eventually some sort of equilibrium is established. The revaluation of the gold dollar immediately set in motion forces that tended to equalize the increased price by raising all prices. These forces were accentuated by the impingement of war; in fact it may be argued that the change from a peace economy to a war economy alone was responsible for the increase in commodity prices. So far as gold mining is concerned the results are the same; higher costs for labor and supplies—the lowered purchasing power of gold—have all but wiped out the stimulating effect of revaluation.

Costs

The first gold produced in California was recovered from placer gravels by extremely primitive methods. At first the gravels were washed and the gold recovered in the hand pan, then by the long tom, the rocker, and by ground sluicing. Much of the flush production of the early years was obtained in this simple manner. In 1852, however, hydraulic mining was invented by E. E. Mattison and this method soon accounted for most of the gold recovered in California. Operating costs were low and the chief capital expense consisted of impounding water and building flumes, or digging ditches, to deliver it under high pressure to the nozzles of the giants.

After hydraulic mining received its death knell in 1884, placer mining was relatively inactive for many years until, in 1898, the crude New Zealand dredge was improved and put to work as California's first

connected-bucket dredge. Dredges were improved and enlarged; the depth to which they could dig was increased. Capital costs grew greater but production costs decreased until they approached the old hydraulic costs. In recent years the dragline and the non-floating washing plant have made productive many placer deposits that are not suited to the bigger and more costly bucket dredge.

In the early days of lode mining in California costs were high and methods inefficient. Little progress was made before 1860. Gradually, however, improvements were made. The arrastre gave way to the stamp. The stamp mill, at first fitted with wooden stems, became heavier and heavier, increasing from 200 pounds to the 1000 and 1500-pound stamps of recent years. Metallic sulphides, often carrying $3 to $4 to the ton of original ore, were thrown away as unrecoverable. This loss was reduced after the introduction, in 1875, of the Frue and Johnston vanners which concentrated the sulphides. The concentrates were treated by chlorination until 1896 when this method was replaced by cyanide. After 1900, when smelters that could treat pyritic concentrates were built, concentrates were shipped direct to the smelters. Dynamite was first used in 1868. Then came the air drill. Crude water wheels, dependent upon seasonal flows, were used for many years. Electric power was introduced in 1890; now its use is almost universal. Then came the internal combustion engine, which proved a boon to the isolated prospect and to many small mines for which electric power was not available or economical. Railroads and highways gradually brought the mines closer to the source of supplies so that it was no longer necessary to stock up against the virtual isolation caused by the mud choked roads of the rainy season.

As a result of these improvements and better operating conditions mining and milling costs were lowered steadily. In the 1860's, ore running $17 to $20 a ton was not considered profitable as a rule. In 1874-75, the cost of mining and milling at the Eureka mine was $9.07 a ton and at the Keystone $7.16. Wages were $3 a shift. In 1875, the average cost of mining and milling in Amador County was $6.50 a ton. By 1913 the average cost of mining and milling in the Mother Lode counties must have been less than $3.81 a ton since that was the average value of the metals recovered (Table No. 5). For many mines, working small tonnages of high-grade ore, costs were still high but other mines treating larger tonnages of low-grade ores made enviable records. Costs of $2 a ton were not unusual; in 1908-10, costs at the Melones mine, including all charges except marketing of concentrates, were $1.08 a ton, a record made possible by unusually favorable geological and physical conditions.

During the first years of the lavish production of the early 1850's commodities were dear and wages were high, but as the rich placers began to fail the boom collapsed. Living costs fell and miners' wages went to levels that would now seem low. For years the prevailing wage was $50 to $60 per month and board. As communities built up and boarding houses were abandoned wages advanced to $3 per shift. In the Mother Lode counties and in northern California generally, wages remained at about this level until World War I. In the southern and middle counties wages increased faster but they were still low as judged by modern standards. Low wages were always a factor in the low costs

achieved, particularly along the Mother Lode and in Grass Valley. The low wages, however, were compensated by low living costs so that real wages, measured in terms of their purchasing power, were not so far out of line with the wages paid in urban industrial centers and were higher than those paid in agricultural communities.

From the beginning of gold mining in California in 1848 to World War I, and particularly in the later years of that period, production costs were reduced in spite of conditions that in themselves tended to increase costs. The richer surface ores of the lode mines had been depleted, and the more easily won placers had been taken; the mines were digging deeper and the ores were becoming leaner. Why costs were lowered instead of going up may be explained by improvements in methods and technique of mining and treatment; better transportation; cheaper, more readily available power; and the increasing use of labor saving machinery. Costs had not been reduced by lowering wages; in fact the shift rate had been increased slightly and the hourly rate had been increased by reducing the working hours of the shift. The labor cost per ton of ore had been reduced, however. The efficiency of labor rose steadily, due to the increasing use of bigger and better machines and tools, which resulted in a greater output per man-shift and a correspondingly lower labor cost per ton.

Following World War I and continuing until 1930 the tide of rising costs became too strong for many gold producers; it swept away their narrow margin of profit. The mines that could not reduce production costs to keep pace with rising prices, either by further improvements in technology or by mining higher grade ore, had to close. For those mines that were able to survive, however, production costs, although higher than before World War I, were still not much above those of the early years of lode mining. Table No. 5 indicates that the average cost of Mother Lode mines operating in the 1920's must have been less than $7 a ton, which was the average recovery for the Lode. For the most part these were not the same mines that had an average cost of $6.50 in 1875 but they were in the same district and as nearly comparable as may be. Labor in 1875 was $3 a day; in 1926 it was from $4 to $4.50 a shift. Notwithstanding, better methods and better equipment, which in turn made possible the mining of larger tonnages and lower grade ore, kept costs to practically the same figure as that of 1875. Even in the 1930's, when wages had risen to $5 and over per shift, the Mother Lode mines paid all costs out of ores that yielded an average gross return of not much over $6 to the ton, and the average content of all gold and gold-silver ore produced in the State was under $6 (Table No. 6). As an industry gold mining has continued through the years, surmounting obstacles, abiding the lean years, surviving the exhausting of a natural asset by the skill and ingenuity of the operators, the courage of capital, and the husbanding of the fruits of the fat years; by all these, but not at the expense of labor.

Average production costs are of value in studying the trends of the industry but, being average costs, including the high and low cost producers, and being heavily influenced by the records of the large-tonnage, low-cost mines, they can be applied only to the industry as a whole.

The production costs of individual mines are useful for comparisons but unless all conditions are known the comparisons may be misleading. The principal factors affecting the cost of mining are the size and tenor of the orebody. If the ore occurs in a narrow vein the cost per ton will be high; if the ore is massive, mining costs should be low. Other factors such as the treatment necessary to extract the valuable minerals, the cost and efficiency of labor, the cost of supplies, the depth at which the ore is mined, and the accessibility of the mine affect the cost of production. No two mines are identical and the difficulty of reducing all the conditions and cost factors to a common denominator makes it almost impossible to make true comparisons. This is particularly true when comparisons of per-ton costs are made. Costs are usually reported on a per ton basis, and rightly so, because the operator who compiles the cost figures deals in tonnages, but by themselves costs *per ton* are meaningless. Because one mine may be mining and treating ore at a lower cost per ton than another does not of itself mean that the mine is more profitable or better managed. A mine may make a world's record in costs per ton but fail to make a profit sufficient to keep it in business. Inasmuch as it is the ounces of gold recovered, not the tons of ore mined, that determines the profit or loss, in the final analysis, it is the total production cost *per ounce* that counts.

Table No. 7 gives the costs of the six leading lode mines of California for the year 1939. The figures show a wide variation in the costs per ton of ore mined and milled. A great difference in tonnage costs could be shown even in one mine—the Carson Hill—where two types of mining operations were carried on. At this mine one-third of the ore was taken from surface pits by power shovels, the remainder was mined underground. Segregated costs are not reported but doubtless the lower cost of surface mining reduced the total average cost of all ore mined. The wide variation in costs per ton shown in the Table is not as significant as might appear at first glance; the difference in total costs per ounce produced is not so great. It is worth noting that the producer having the highest cost per ton had the lowest cost per ounce and therefore the highest percentage profit.

The costs of the two dredging companies are of interest in showing that although the dredges recover gold at a cost per cubic yard of gravel (equal approximately 1.35 tons) that would make the lode miner envious, the cost per ounce recovered need give him no cause for chagrin.

The listing of mines in Table No. 7 was limited to those whose costs are published and readily available but it happens that they were among the ten leading producers in 1939. The six lode mines listed produced in that year 25 per cent of the tonnage treated and 42 per cent of the gold recovered by all the gold and gold-silver lode mines of the State.

Mine accounting usually separates costs into direct and indirect charges. Definitions of these charges differ at different mines and this leads to confusion and difficulty in comparing the costs themselves. Direct costs, however, are generally understood to mean the costs properly chargeable to mining and treatment, such as labor, power, supplies, and direct supervision of the operations. Indirect charges generally include such items as head office expense, depreciation, depletion, and taxation.

TABLE No. 7

Costs of Eight Leading Producers †

Mine	Year ending	Tons treated during year	Ounces recovered		Direct costs before general charges, taxes, depreciation, depletion		Taxes per ounce	Total costs to and including depletion		Labor	
			Total	Per ton treated	Per ton treated	Per ounce recovered		Per ton	Per ounce	Cost per ton	Per cent of total cost
Lode mines:											
Argonaut	12/31/39	90,900	[1]19,905	0.219	$7 49	$34 20	[2]$0 23	[3]$7 69	[3]$35 11	*	*
Carson Hill	9/30/39	394,213	26,776	0.0679	1 75	25 78	[2]0 40	2 22	32 85	$0 94	42.3
Central Eureka	12/31/39	50,242	36,068	0.717	[4]10 98	[4]15 30	[2]2 57	13 38	18 64	*	*
Empire Star	12/31/39	258,864	93,926	0.362	[5]8 61	[5]23 73	*	*	*	*	*
Idaho-Maryland	12/31/39	[6]410,411	[7]115,001	[7]0.280	4 95	17 72	[8]0 97	7 59	27 18	3 75	49.4
Lava Cap	12/31/39	116,380	[1]39,997	0.344	7 45	21 68	[9]1 70	[3]9 18	[3]26 72	[10]4 86	52.9
Placer (connected-bucket dredging):											
Yuba Cons.	2/28/40	x43,233,744	143,374	y11.3	y4 29	12 92	3 37	y8 72	26 31	y1.9	21.7
Natomas	12/31/39	x28,395,158	91,894	y11.32	y4 08	12 60	4 18	y7 05	21 79	*	*

† From published financial reports; Poor's Industrial and Financial Records. Moody's Investor's Service.
[1] Reported recovery in dollars divided by $35.
[2] Federal tax only.
[3] Before depletion.
[4] All costs before depreciation, depletion and taxes.
[5] Only figures reported are: Tons milled; ounces recovered; net income. Costs assumed as gross income (ounces times $35) less net income.
[6] Company ore only. In addition 24,103 tons of custom ore and concentrate treated.
[7] Recovered from company ore.
[8] Federal taxes only. Other taxes, plus insurance and royalties—$2.58 per ounce.
[9] All taxes and including some miscellaneous expense.
[10] Information Circular 7164 of the U. S. Bureau of Mines gives labor cost per ton of ore mined as $3.58; equals 65% of mining costs. Assuming that 65% of ore treatment and realization cost of $1.96 is labor, the total is $4.86 for mining and treatment.
* No information.
x Cubic yards.
y Cents per cubic yard.

Indirect costs are, for the most part, outside the control of the operator. Taxes, depreciation of plant and equipment, and depletion of his ore reserves are real costs which no amount of technology and good management can avoid. There are other costs beyond the operator's control. Compensation insurance rates are set by the State and the amount payable in net premiums can be reduced only by self insurers who are financially able to impound the amount of money required by the State to guarantee the payment of all risks. Legislation has often been inimical to the interests of the miner; such as laws prohibiting the disposal of tailings in creeks and rivers, and laws prohibiting the so-called pollution of streams by placer operations.

Federal taxes have become a heavy load on all business but they bear with especial weight upon the shoulders of the gold miner. Federal taxation does not take proper account of the fact that a mine is a wasting asset and that by the time a mine is exhausted it must return to the investor enough money to retire his investment and leave him something over for his final profit. There is no real profit until the money invested has been recaptured. The Excess Profits Tax takes a large share of the annual operating profit. In addition to threatening the life of the enterprise this taxation has a discouraging effect upon the development of new properties and even the betterment of plant facilities at operating mines. The investor is not inclined to take the normal risk inherent in mining when the greater part of the annual profit he may be fortunate enough to make is taken by taxation before he has a chance to retire his investment.

The operator has a certain measure of control over direct costs. Ordinarily he can not reduce the rate at which power is sold or the purchase price of supplies or arbitrarily reduce the wage rate but he may be able to lower the cost of labor by increasing its efficiency; by using more labor saving machinery, or by incentive methods such as the payment of a bonus, or contracting of development work. He may be able to reduce his power, supply, and repair costs by improving methods of mining or by using better and more efficient equipment. Even if unable to reduce his per ton costs he may be able to lower his per ounce costs by improving treatment methods so that he obtains a larger gold recovery at the same cost per ton.

How far the gold miner can go in reducing current operating costs is of great importance to the immediate future of the industry. That he can go far enough seems doubtful. To believe that operating efficiency has reached its peak in gold mining and that no further improvements will be made is to discount human ingenuity too heavily. Notwithstanding, it is difficult to visualize great cost-reducing methods or processes. When the average recovery of an efficient mill is better than 90 per cent—and in some mills exceeds 95 per cent—the end point can not be far away, and there does not seem to be much hope of materially reducing production cost by increasing recovery.

Doubtless new cost-serving methods of mining and lower cost metallurgical processes will come in time, but it seems safe to predict that no radical innovations will be introduced with the entrance of the Post-War period. Gold mining was given a paralyzing blow by the War Production Board's Closing Order L-208; after the war all the energy

of the industry will be centered in rehabilitation. Technological research will be postponed.

When, after the war, gold mining can be resumed, costs will be much higher than in the last "normal" year, 1939. Federal taxation will be at higher rates, unless the recommendation for abolition of the Excess Profits Tax and the modification of the Capital Gains Tax made at the conference of the delegates of the governors of eleven Western States and South Dakota, and by numerous mining organizations, are followed by Congress.

Direct costs also will be higher, due almost entirely to the higher wage rate, now prevailing. Power rates in general have not been increased and the cost of supplies has not increased much, if any, over 25 per cent, but labor now receives from 60 to 100 per cent more than in 1939.

That labor may not insist the mines pay war-plant wages after the war is indicated by the contract made between the Grass Valley Mines and the local union in July, 1944, to run for two years. Under that contract the rate is set at $6.22 per 8-hour day, provided the miner works a 48-hour week, thereby being paid time and a half for time over 40 hours. This would mean $40.44 a week, or $6.74 per 8-hour day. Any net increase to the operator in the price of gold gives the miner 8 cents per day per dollar of the increase. If a similar rate prevails in the other mining districts of California, the effect upon gold mining, of course, will be more favorable than if the current rate for war plant and certain strategic metal mines of $1 to $1.25 per hour obtains, but the fact remains that even so wages would be fully 50 per cent over the 1939 rate. This makes a heavy load on an industry that can not raise the price of its product to balance the increase in production costs.

In lode mining the average labor cost is over 65 per cent of the mining cost, and over 50 per cent of the total production cost. If, then, labor's wage is increased 50 per cent, the total production cost is increased 25 per cent. The cost of such mine and mill supplies as drill steel, timber, mill reagents, metal fabricated parts, supplies which usually aggregate about 20 per cent of total production costs, may be expected to be about 25 per cent over 1939 at the conclusion of the war. Such an increase would mean a 5 per cent increase in total costs. How these increases in costs, and particularly the increase in labor costs, will affect gold mining in the Postwar period may be suggested by the comparisons given in Table No. 8. The figures are hypothetical. It is assumed that the labor cost in 1939 was 50 per cent of the total production cost and that, due to the increase in wages, this cost has now increased 50 per cent. It is assumed that the cost of certain supplies, such as drill steel and other supplies mentioned above, were 20 per cent of total costs in 1939 and that in the Postwar period these supplies will be 25 per cent higher. It is assumed that all other cost items constituted 30 per cent of total costs in 1939. These other costs include such items as explosives and power, which have not increased in price, and general charges which are assumed to be unchanged. Total costs are before depletion and taxes because the introduction of these variables would contribute to confusion without adding value to the comparisons.

TABLE No. 8

COSTS COMPARED WITH VARIOUS RECOVERIES

(1) Profit in 1939, 20 per cent of gross recovery: $7.00 per ounce

	Costs per ounce	
	1939	Present
Costs:		
Labor (50%)	$14 00	$21 00 (increase 50%)
Certain supplies (20%)	5 60	7 00 (increase 25%)
All other charges (30%)	8 40	8 40 (no change)
Total (100%)	$28 00	$36 40
Profit	7 00 (20%)	1 40 (loss)
Total recovery	$35 00	$35 00

Increase in costs over 1939 .... $ 8.40 per ounce
Increase in value by revaluation in 1934 .... 14.33 per ounce
Gain of revaluation absorbed by increased costs 59%

(2) Profit in 1939, 30 per cent of gross recovery: $10.50 per ounce

	Costs per ounce	
	1939	Present
Costs:		
Labor (50%)	$12 25	$18 375 (increase 50%)
Certain supplies (20%)	4 90	6 125 (increase 25%)
All other charges (30%)	7 35	7 350 (no change)
Total (100%)	$24 50	$31 850
Profit	10 50 (30%)	3 150 (9%)
Total recovery	$35 00	$35 000

Increase in costs over 1939 .... $ 7.35 per ounce
Increase in value by revaluation in 1934 .... 14.33 per ounce
Gain of revaluation absorbed by increased costs 51%

(3) Profit in 1939, 40 per cent of gross recovery: $14.00 per ounce

	Costs per ounce	
	1939	Present
Costs:		
Labor (50%)	$10 50	$15 75 (increase 50%)
Certain supplies (20%)	4 20	5 25 (increase 25%)
All other charges (30%)	6 30	6 30 (no change)
Total (100%)	$21 00	$27 30
Profit	$14 00 (40%)	7 70 (22%)
Total recovery	$35 00	$35 00

Increase in costs over 1939 .... $ 6.30 per ounce
Increase in value by revaluation in 1934 .... 14.33 per ounce
Gain of revaluation absorbed by increased costs 44%

In the examples it is assumed the ratio of profit to total recovered value (gross income) in 1939 was 20 per cent, 30 per cent, or 40 per cent. The first example has the greatest application because few mines are in the 20 per cent or higher profit class. Most mines would be well satisfied with a 20 per cent return; the average mine does not do that well.

In example (1) the increase of $7 in the labor cost per ounce absorbs the profit that was made in 1939. The increase in the supply cost takes $1.40 per ounce more. The two cost increases produce a loss of $1.40 per ounce. In the other examples the increased costs, and especially the labor cost, appreciably reduce the 1939 profit but not to the point of actual loss. Returning to example (1), total costs increase $8.40 per ounce, an increase that absorbs nearly 60 per cent of the advantage gained by the increase in the price of gold from $20.67 to $35 per ounce. Another way of stating this is that in the first example an increase of $8.40 per ounce in the price of gold would enable the mine to pay the increased labor and supply cost, and still have the same profit per ounce as in 1939. The percentage profit, however, would still be less. Mines having a profit of less than 20 per cent of the gross recovery in 1939, would now require an increase of more than $8.40 per ounce to obtain the same profit per ounce as in 1939.

To postulate $8.40 an ounce as a definite figure is not the purpose of this analysis. It is a figure obtained by calculations based on cost relations that, with the data now available, can not be measured in exact terms. On the other hand the relative proportions of the cost items and the estimated increases over the costs of 1939 must be nearly correct. Therefore, if the figure of $8 per ounce is used understandingly, as an abstract but not a concrete measure, its application will permit drawing some conclusions.

(1) The increase in production costs, over those of 1939, due chiefly to the increase in wages, will absorb from 44 to 60 per cent of the advantage gained by revaluation in 1934.

For the gold mine that did not make a profit exceeding 20 per cent of its gross recovery in 1939, the increase in production costs is equivalent to a reduction in the price of gold of $8, or more, per ounce. Conversely the price of gold would have to be raised $8, or more, per ounce to place the mine in the same profit position it held in 1939. Under existing costs the mine could not produce at a profit. This statement applies to most of the gold mines of California (since, in 1939, few of the mines in the State realized a profit as high as 20 per cent of the gross return) with these exceptions: the mines in this class that can reduce production costs by the methods discussed in (3), (4) and (5) hereunder, may be able to produce gold at some profit.

(2) The mines that realized a profit of 30 to 40 per cent in 1939 may be able to stand the higher cost of labor and supplies, and continue to employ the same number of men and make the same production. In California, however, there were few mines indeed that realized such a high percentage return in 1939. Mines of this caliber are usually small and high grade. They are short-lived and cannot be expected to long continue or to contribute much to the total gold production or total gold mine employment.

(3) The mines that are able to selectively mine higher grade ore at no great increase in man-hours per ton, thus decreasing the cost per ounce and increasing the percentage profit, may be able to meet the higher production costs. Such a procedure leaves in the mine ore that formerly was profitable; it risks the permanent loss of ore reserves—that may again be valuable—through flooding and caving of the workings. By reducing the tonnage that might have been taken, the life of the mine is shortened, in which case the annual return may not be sufficient to retire the capital expenditure during the shortened life of the property. This consideration becomes important if capital is needed for a new property or for improvements at an operating mine. Mines in this class contribute the bulk of the production in California. Many will continue, but at a declining rate.

(4) The mines that can reduce labor costs by methods that require fewer man-hours per ton may be able to operate. This holds true, also, for those mines in which the labor costs in 1939 were low enough in proportion to total costs to alleviate the effects of a 50 per cent increase in wages; in other words to mines for which the cost increases calculated in the examples above are too high. In general, reducing the man hours per ton of ore produced means greater mechanization; automatic drills that do not need to be cranked; "Jumbos," the carriages upon which rock drills are mounted and moved to the drilling face, so that the miner does not have to set up and tear down his drill; electrical haulage, and the like. Increased mechanization, however, means increased capital expenditure and not all mines have a great enough ore expectancy or a large enough profit per ton to warrant substantial outlays. In the category of mines that are less affected by wage increases are the connected-bucket dredges in which the extent of mechanization is such that the labor cost is not as big an item. The dragline dredges, however, may face a serious situation. Much of this equipment has been rented or purchased by war agencies and contractors. After the war much of it will have to be replaced or repaired. The dragline crews in general followed their equipment into war work, and having been employed at war-time wages they may not be content to return to a wage scale that will permit profitable operations.

(5) The efficiency of labor is increased by the use of machines that permit a greater output per shift. There is another efficiency of labor which, for lack of a better term, might be called "The Will to Produce." Both management and labor are inclined to slacken efforts when everything comes to easily. The manager of a mine that is paying handsome dividends may become quite complacent, and do little worrying about costs, but if the ore turns lean and profits diminish he must reduce costs or risk losing his job. Similarly, if the miner knows that the mine in which he works is undermanned and there is no competition for his job, he will not be particularly concerned over the amount of ore he breaks. On the other hand, if on going on shift he sees a long line of "Rustlers" at the mine foreman's window, he is going to put in the best day's work of which he is capable. One of the reasons that costs were lowered in the early days of the depression was the available supply of labor. If the miner will recognize that his worth is in direct proportion to the amount he produces and the "slow-down" is done away with, the cost of labor per ton and per ounce can be greatly reduced without reducing wages. No figures of the cost of labor in terms of its voluntary efficiency are

available, but many engineers, mine managers, and even laborers themselves are of the opinion that the increase in wages over the 1939 scale can be compensated fully by an increase in the efficiency of labor.

On the whole, the increase in labor costs will act as a deterrent to gold mining after the war. Thus labor, demanding higher wages, has jeopardized the opportunities for full employment in the gold mining industry in the post-war period.

Ore Reserves

Just as the profit that may be won in extracting the valuable minerals from a rock determine whether that rock is ore or waste, so ore reserves are a function of the cost of production and the price at which the product may be sold; in other words, the profit.

As has been seen, gold mining runs counter to general business activity; in periods of depression it prospers; in periods of general prosperity it has to fight for survival. In the one case the profit per ounce is increased by lowered costs and the augmented purchasing power of gold; in the other case the reverse is true. The one automatically adds to the volume of ore reserves by giving value to gold bearing rock that previously could not be utilized at a profit, the other causes ore reserves to shrink by decreasing the value of some of the formerly low-grade but profitable ore.

Revaluation of the price of gold acts the same way as a business depression in increasing the ore reserves of known deposits. A secondary and delayed effect is to stimulate prospecting and development, which bring in new increments to the already known ore reserves. In this respect, however, a period of prosperity in gold mining, caused by a general business depression, does not follow a parallel course. Again gold mining presents an anomaly, experiencing forces the reverse of those that influence other branches of mining. The search for new deposits of a metal is usually carried on at a time when the metal enjoys prosperity and speculative money is attracted to it. When gold mining enjoys prosperity because of a general business depression there is the incentive to search for and develop new orebodies, but at such times venture money from sources outside the industry is often lacking or hesitant. Even the beneficiaries of the prosperous industry, the shareholders in gold mines and the management of operating mines, may becomes so enveloped in the fog of defeatism about them that they refrain from vigorous search.

This does not mean there is no prospecting and development in such a period. On the contrary, many mining organizations develop new ore reserves and look for new orebodies but because of the inhibiting atmosphere of a major business depression and the difficulty of securing venture money from men engaged in other business, the effort is not as great, nor the results as important as might be expected. New ore reserves are brought in, but in inverse ratio to the magnitude of the depression. In periods of depression, it is true, there is more individual prospecting and small scale development. The jobless turn to gold. But this is no longer significant. Only rarely, now, does the prospector find a mine which he can work with his bare hands. He needs money for development, and in periods of financial stress he does not get it. During depressions the prospector and small miner will continue to bring in new ore reserves but at an ever diminishing rate.

When gold mining entered the period of prosperity brought about by the increase in the price of gold in 1933-34, the effect upon the search for new deposits differed from that produced by the depression of the years immediately preceding. The increase in value given to gold was immediate and definite, quite different from the gradual increase in purchasing power caused by the slowly accumulating forces of the business depression. Mining companies increased development in existing mines and searched for new deposits. The prospectors and small miners intensified their efforts, animated by the hope of finding ore deposits they could work themselves, and confident that venture money would be forthcoming if needed. Many new and important ore deposits were added to the ore reserves of the State as a result of the stimulated search.

In any period, prospecting and small mine development would be greatly aided if some of the difficulties encountered by the prospector and small miner could be removed or alleviated. One potent and almost insurmountable obstacle to small mine financing is the administration of State and Federal Securities Exchange Commissions. Also, the Capital Gains tax, which takes a large share of the profits realized in the sale of a property, discourages the development of a prospect by small capital that must eventually seek financial aid.

There are no published data upon which to base an estimate of the actual shrinkage of California ore reserves in periods of high production costs or the increase in ore reserves in periods of low production costs which are caused either by a depression or revaluation. Doubtless the information exists in the confidential files of Government agencies. A study of the relation between ore reserves and production costs might give results that would be of economic interest. Croston[1] from a study of available information of ore reserves of the world's gold mines gives the rough quantitative estimate that revaluation in 1934 increased the tonnage of the ore reserves of the gold lode mines of the world (excepting Russia) by more than 75 per cent and their total gold content by about 60 percent. How much California's gold reserves increased is unknown. That the increase was great is certain; otherwise production could not have increased so rapidly. It is interesting to note that an increase of nearly 75 per cent in the price of gold, brought out in the decade 1932-41, from the gold and gold-silver lode mines alone, nearly six million ounces, or nearly twenty times the 1931 production, and thirty-four million tons of ore, or thirty-four times the tonnage of 1931.

Very few of the operating gold mines of California develop ore reserves more than a few years in advance. The average gold mine does not lend itself to much advance development. The orebodies may be irregular or the expense of keeping development headings open until ore extraction begins may be too great. Then too, the tax situation discourages the development of ore reserves. Nearly all of the mining counties of the State tax developed ore reserves as assets. In all fairness to the gold producer it must be pointed out that the ore reserves that may have value today but, on account of rising production costs or economic changes, may have little value another day, is an uncertain and intangible asset. Few California companies report ore reserves. In consequence little information is available.

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[1] Croston, John J. Effects of Revaluation on the Gold Mining Industry. Trans. A. I. M. E. Vol. 126, 1937, pp. 301-334.

Under existing conditions of production costs, and the price of gold fixed at $35 an ounce, the ore reserves of California are undoubtedly reduced again. Probably the reserves of the connected-bucket placers are essentially the same as in 1939. The reserves of the lode mines, however, must have shrunk to levels of 1933, when gold brought $25 an ounce; that is to levels that reflect the absorption by current increased costs of 60 per cent of the advantage gained by revaluation. The opportunities for employment in the gold industry, and especially in the lode mines, have shrunk, probably in the same proportion.

The potential ore reserves of California can not be estimated or even conjectured with confidence. In dealing with mineral deposits, which, with every ton of ore removed are that much nearer eventual exhaustion, the future can not be predicted from the past. And yet past production has some bearing on future production. No one would predict much production from some of the counties that have produced little in the past, and no one would venture to say that the mines of Nevada County, having contributed such a large amount of gold, can have little left. California has produced over one hundred million ounces of gold, valued at over two billion dollars, in less than one hundred years. This is not to say that California mines will produce another hundred million ounces, but—they might. Mining districts, like good mines, die hard. In view of the measured millions of yards of gravel that could be treated at a profit today if the problems of water supply and debris disposal could be solved, the millions of tons of ore that are not now, or never have been commercial but with better technology or higher prices for gold could yield a profit, and the probabilities that science will one day develop instruments capable of disclosing orebodies now hidden and unpredictable, the potential gold reserves of California must mount to astronomical figures.

In the known gold reserves and also in the only partly known gold resources of California there exists a tremendous reservoir of employment that can be utilized when the gold miner is willing to work for a wage the mines can pay. This time may come if gold is again revalued, provided labor does not then demand a wage that will again absorb all the advantages of the revaluation. The reservoir of employment may be drawn upon in another depression or at any time jobs are scarce. It may be utilized when radical improvements in technology or methods are developed. It is there—waiting.

Silver

For the years 1848 through 1943, the silver produced in California, as reported in the Minerals Yearbooks of the U. S. Bureau of Mines, totals 105,091,703 ounces valued at $84,800,447. In the same period gold production amounted to 101,262,996 ounces valued at $2,246,287,561. This is nearly ounce for ounce in metal but the value of the gold output is twenty-seven times that of silver.

Despite the contribution of silver to the wealth of the State, silver mining as an entity does not exist in California. As is shown by the figures for 1939 (Table No. 9), which fairly represents the trend of recent years, a very small proportion of the silver production was from purely silver ores; nearly 90 per cent was a by-product in the mining of gold and gold-silver ores.

Of the ten leading silver producers in 1939, five yielded silver from gold ores. Four of these mines were among the ten leading gold producers of the State and the fifth was seventeenth in the gold list. Four of the silver mines furnished silver from gold-silver ores, one of them ranking fifteenth in gold production. Ranking sixth as a silver producer was a copper mine which accounted for most of the silver produced by copper mining.

Silver is more important to the gold producers of the southern counties, especially Kern, Inyo, and San Bernardino, in the order named. In 1939, these counties produced 52 per cent of the silver of the State. The value of their silver production, however, was less than one-fourth of the value of their gold output, which would indicate that, despite the importance to them of silver, the chief dependence of the gold-silver mines of these counties is on gold.

In the preceding discussion of the gold mining industry, silver has been considered as an integral part of gold production. Likewise, estimates of the employment offered by silver are included in with the estimates for gold.

TABLE No. 9

California Silver Production in 1939 *

Source	Total ounces of silver recovered	Per cent of total
Gold ore	1,209,975	46.5
Gold-silver ore	1,086,767	41.7
Silver ore	42,132	1.6
Copper ore	195,972	7.6
Lead ore	7,902	0.3
Lead-zinc ore	260	----
Total lode mines	2,543,008	97.7
Placer mines	56,131	2.3
Totals	2,599,139	100.0

* From Minerals Yearbook, Review of 1939, page 215, U. S. Bureau of Mines.

Postwar Employment

Any predictions as to post-war employment by the gold industry of California must be predicated to a considerable extent upon the employment prior to the war. The year 1939 has been chosen as a year sufficiently removed from the first heady years of revaluation and from the difficult years of World War II to represent reasonably normal pre-war conditions.

As is shown in Tables 10, 11, 12, the gold production of 1939 was furnished by 1,028 lode mines and 749 placer mines, or a total of 1,777 mines of all classes. Of the lode mines 98 per cent of the production came from 1,003 gold and gold-silver mines. The production, and therefore the employment, of the copper, lead and lead-zinc mines is unimportant and will not be considered. For the placer mines 92 per cent of the production was furnished by 148 dredges of the connected-bucket, and the dragline and non-floating types, and 8 per cent by hydraulic, drift, and miscellaneous small mines.

TABLE No. 10

California Gold Production (Lode) in 1939
Classified by Types of Ore and Size of Operations

(Compiled by CHARLES WHITE MERRILL, Supervising Engineer, San Francisco Office, Bureau of Mines, U. S. Department of the Interior.)

Size of operation (Fine ounces of gold)	Lode									
	Gold ore		Silver and gold-silver ore		Copper ore		Lead and lead-zinc ore		Total lode	
	Mines producing	Fine ounces	Mines producing	Fine ounces	Mines producing	Fine ounces	Mines producing	Fine ounces	Mines producing	Fine ounces
10,000 and over	18	526,685	1	13,354	1	12,869	----	----	20	552,908
2,001 to 10,000	31	148,235	2	6,513	----	----	----	----	33	154,748
501 to 2,000	44	52,974	2	1,784	----	----	----	----	46	54,758
101 to 500	107	21,638	2	612	----	----	----	----	109	22,250
31 to 100	161	9,094	3	124	1	39	1	76	166	9,333
30 and less	613	[1]5,040	19	54	11	54	11	74	654	[1]5,222
Totals	974	763,666	29	22,441	13	12,962	12	150	1,028	799,219

[1] Includes output of itinerant prospectors, snipers, high graders, and others who give no evidence of legal right to property.

TABLE No. 11

California Gold Production (Placer) in 1939
Classified by Methods of Mining and Sizes of Operation

(Compiled by CHARLES WHITE MERRILL, Supervising Engineer, San Francisco Office, Bureau of Mines, U. S. Department of the Interior.)

Size of operation	Placer													
	Connected-bucket dredge		Dragline dredge		Nonfloating washing plant		Hydraulic		Drift		Small-scale hand methods		Total placers	
(Fine ounces of gold)	Mines producing	Fine ounces	Mines producing	Fine ounces	Mines producing	Fine ounces	Mines producing	Fine ounces	Mines producing	Fine ounces	Mines producing	Fine ounces	Mines producing	Fine ounces
10,000 and over	7	258,201	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	7	258,201
2,001 to 10,000	17	105,200	28	105,056	3	18,457	----------	----------	----------	----------	----------	----------	48	228,713
501 to 2,000	5	6,060	53	56,619	18	14,393	2	2,241	3	2,551	----------	----------	81	81,864
101 to 500	2	647	32	9,745	31	7,081	10	2,325	12	2,317	7	916	94	23,031
31 to 100	2	131	14	895	23	1,312	16	972	18	1,003	22	1,075	95	5,388
30 and less	1	25	15	204	39	451	46	521	61	654	263	[1]36,993	425	[1]38,848
Totals	34	370,264	142	172,519	114	41,694	74	6,059	94	6,525	292	38,984	[2]749	636,045

[1] Includes output of itinerant prospectors, snipers, high graders, and others who give no evidence of legal right to property.
[2] A mine using more than one method of recovery is counted but once in arriving at total for all methods.

In 1939, total employment in the gold mining industry was distributed about as follows:

	Employment	
Placer Mines		
Connected-bucket dredges	1,800	
Dragline and nonfloating dredges	1,500	
Miscellaneous small placers and snipers	2,000	
		5,300
Lode Mines		
207 mines producing over 100 ounces	7,000	
795 smaller mines and nonproducers	1,560	
1,003 mines		8,560
Total		13,860

By 1943 the number of producing mines had dropped to 139 lode mines and 82 placers, making a total of 221, as compared with 1,777 in 1939. The mines producing over 200 ounces dropped to 37, as against 294.

The labor cost of mining with connected-bucket dredges was comparatively low, probably less than 25 per cent of total costs, in the pre-war period. In consequence the dredges will be less influenced by higher wages than lode mines. They may be expected to return to the pre-war status of activity and employment as soon as men and materials are available. Dredging company officials believe they will employ 1600 men about as follows:

Direct dredge operations	1,000
Prospecting and development	100
Field shops, offices, etc.	500
Total	1,600

Manufacturing plants, building dredges, making spare parts, etc., are expected to employ 1,000 men. Employment in incidental manufacturing is a proper credit to dredging but as estimates of post-war employment in other branches of the mining industry do not include collateral industries, employment incidental to actual dredge operations will not be included here.

The dragline and non-floating types of dredges, which employed 1,500 men in the pre-war period, will not be able to offer like employment immediately after the war. Their equipment, which, in great part was taken over by war projects, will have to be repaired and replaced, and there is some question whether their former employees will be willing to accept the wages the dragline operators can pay. C. A. Logan[1] estimates this type of placer mining will not employ over 500 men.

Probably 1,000 men will be employed—many of them self-employed—by hydraulic, drift and small-scale placer mining. The owners and lessees of these small properties, lured by the hope of becoming financially independent, doubtless will return to their small operations as soon as the war is over. The number of the wage earners that will return will be influenced by the jobs available and the rates of pay in other industries.

Summing up, the grand total of men that placer mining may be expected to employ in the post-war period will be about 3,100.

[1] District Mining Engineer, Division of Mines, Sacramento, Calif.

TABLE No. 12

California Gold Production in 1939
Classified by Types of Ore (Lode) and Methods of Mining (Placer) and by Sizes of Operation

(Compiled by CHARLES WHITE MERRILL, Supervising Engineer, San Francisco Office, Bureau of Mines, U. S. Department of the Interior.)

Size of operation (Fine ounces of gold)	Total lode and placer	
	Mines producing	Fine ounces
10,000 and over	27	811,109
2,001 to 10,000	83	383,461
501 to 2,000	125	136,622
101 to 500	207	45,281
31 to 100	259	14,721
30 and less	1,077	44,070
Totals	[1]1,777	1,435,264

[1] A mine using more than one method of recovery is counted but once in arriving at total for all methods.

The degree to which lode mining can be resumed after the war will depend upon the ability of the mines to adapt themselves to the higher cost of labor. As the mines have been inactive during the war there is no criterion for measuring the full effect of increased labor costs. That many mines will be unable to resume operations is certain.

A canvas of the 10 leading gold producers of 1939 indicates that 4 of them may be expected to employ about 2,000 men, or about 400 less than they employed in 1939. Three of the mines, formerly employing a total of 400 men, will not resume. The other 3 mines, formerly employing 660 men, will not re-open unless the wage rate is lowered or the price of gold increased. For the 10 leading mines, 2,000 men will be employed where 3,500 were employed before the war. Expected postwar employment is 57 per cent of 1939 employment.

A similar canvas was made of 42 smaller mines, each of which produced over 500 ounces in 1939. The 42 mines employed 2,000 men in 1939. After the war 24 mines expect to employ 800 men, 2 mines will not re-open and 16 mines will resume operations only when wages are lower or the price of gold increased. The total expectancy of this group is 800 men, or 40 per cent of the 1939 payroll.

The total employment indicated for these 52 mines is 2,800 men, or 51 per cent of the 5,500 men employed by these same mines in 1939. It is believed this total is too high. Some of the operators are firm in the belief that the price of gold will be raised and have unconsciously colored their estimates. It seems advisable to reduce the estimate of 2,800 a little over 10 per cent or to 2,500.

The canvas covers 52 of the 207 mines that produced over 100 ounces each and employed a total of 7,000 men in 1939. The 52 mines employed 5,500 men in 1939, so the remaining 155 mines in this group employed 1,500 men. It appears that the postwar mortality of gold mines will increase as the size of the mine decreases: the indicated postwar employment of the 10 leaders is 57 per cent of the 1939 employment whereas it is 40 per cent for the 42 smaller mines. It seems fair, then,

to assume the 155 mines that were not canvassed will employ not over 30 per cent of the 1,500 men on their payroll in 1939, or a total of 450 men. The total expectancy for the 207 mines is 2,950 men. This indicates a shrinkage from 1939 of 4,050 men.

Estimation of the probable employment in the mines that produce less than 100 ounces a year is more difficult. In 1939, there were 796 mines in this class. They employed 1,560 men. The count included many self employed miners, such as lessees, highgraders, and prospectors. Many of the small mines will not re-open; in fact many had ceased operations before Pearl Harbor. Many of the self employed have found steady wages in war plants. How many prospectors, lessees and highgraders will return to mining and how many small venturers will seek to develop prospects into producing mines is indeterminate.

The number of small miners employed in gold mining after the war will depend to a great extent upon their faith in the future of mining. A few inveterate prospectors, a few highgraders and lessees, who can be happy in no other vocation, will be found in the hills no matter what the outlook for gold may be. But their number is negligible. At the present time many mine operators are firm in the conviction that another increase in the price of gold is inevitable. Many believe that a major depression is due and that gold mining will become profitable for this reason alone. If, at the end of the war it is the general belief that, for the one reason or the other, gold mining is about to enter a prosperous stage, many men will turn to gold. If, however, there are indications that the wage rate will not be reduced and may even be increased, if another revaluation of gold seems doubtful, employment in small mines will suffer. Venture money will go into other industries and many of the miners and prospectors who would be self-employed will prefer a measure of security in other employment to the uncertainties of gold mining.

Employment in the small mines may vary within wide limits, but probably it will not exceed 500 at the beginning of the postwar period. This number, plus 2,950 for the larger mines, makes a total of 3,450 for all the gold lode mines in the State. Estimated postwar employment in the gold mining industry is as follows:

	Employment	
Placer Mines		
Connected-bucket dredges	1,600	
Dragline and non-floating dredges	500	
Small placers, snipers, etc.	1,000	
Total		3,100
Lode Mines		
The larger mines	2,950	
Small mines, prospectors, etc.	500	
Total		3,450
All mines		6,550

Coghlan[1], in a separate survey, estimates the minimum expectancy of lode mine employment at 3,400 and of placer mining at 3,000, or a total of 6,400. As the two estimates are in close agreement no adjustment is made in the figures above. All estimates assume the Closing Order L-208 will be lifted at the end of the war; otherwise there would be very little employment in gold mining. Coghlan also estimates

[1] Coghlan, S. R., Employment in the Mineral Industries, pp. 31-41, *ante*.

employment may amount to a total of 11,500, if conditions are favorable.

If the conditions affecting gold mining are the same at the end of the war as they are at the time this is written[2] the industry cannot be expected to employ more than 6,400 to 6,550 men. If the outlook for the industry is improved employment may approach the figure of 11,500. If, at that time, the price of gold is raised a sufficient amount to place the gold mines in the same cost position they occupied in 1939 employment should rise above the levels of pre-war years.

Employment can be increased by conditions that increase the profit in mining, and conditions that encourage prospecting and development by instilling faith in the future of the industry. Among these, essentially in the order of their importance, are:

(1) A wage scale that will compare with 1939.
(2) An increase in the net price of gold to the producer.
(3) Abolition of the Federal Excess Profits and Capital Gains taxes, plus a reasonable downward revision in other taxes.
(4) Modification of the regulations of the Federal and State Securities Acts.

GYPSUM

Gypsum occurs in several forms, the most important in California being rock gypsum and gypsite.

Along the coast range, south of San Francisco, gypsite deposits are found in many localities in Fresno, Kern, Kings, Merced, and San Benito counties, although many of them are small. This type is also found in Los Angeles, Riverside, and San Bernardino.

Important tonnages have been mined in Kern County for agricultural purposes, which use in 1942 and 1943 took over one-half of the production of the State. The largest production in recent years has come from Riverside, Kern and Imperial counties.

The output from Alameda County is synthetic gypsum produced as a by-product in the manufacture of sea-water magnesia.

Extensive deposits of rock gypsum are located in Imperial, Inyo, Riverside and San Bernardino counties. Others of less magnitude are found in Fresno, Orange, Santa Barbara and Ventura counties.

Uses

The largest single use in California during war time has been as raw ground gypsum for agricultural purposes. It is used as a direct source of sulphur trioxide, an essential food for cereals, cotton, hay and other plants. It also renders potash soluble when present as normally unavailable silicate, and stimulates the growth of nitrogen-fixation bacteria in the soil. It also serves other essential functions in both chemical and mechanical conditioning of the soil. In California it is particularly important for fertilizing potatoes, cotton, alfalfa and grapes.

Crude gypsum is also used in substantial amounts as a retarder in the manufacture of Portland cement.

Ordinarily the most important tonnages are calcined and used as hardwall plaster and in the manufacture of plaster board.

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[2] December 1944.

In the United States as a whole, consumption for agricultural use is ordinarily around 10 percent of the total production. Since 1940, however, this amount used in the United States has increased over 400 percent. The California increase cannot be definitely stated as separate statistics are not kept, but it is large enough to account for over 50 percent of the output.

Markets

Sales of crude for agriculture and as cement retarder are usually made direct to the consumer.

Gypsum for plaster is calcined at the deposit and to this extent is "captive" tonnage.

Normally considerable crude gypsum is imported from Canada and Mexico. Canadian imports go entirely to eastern points, but Mexican shipments come into California in competition with domestic mines. Mexican production comes from San Marcos Island, Baja California.

Imports from Mexico in recent years were:

1937	59,166 tons
1938	50,133 tons
1939	58,955 tons
1940	32,134 tons

These imports accounted for about 25 percent of California supplies for the years shown prior to 1940. No imports are recorded for 1941 and publication of later foreign trade statistics has been prohibited during the war.

Tariff Rates

Crude unground gypsum is brought in duty free. Ground or calcined gypsum carries a tariff of $1.40 per ton.

Prices

Crude gypsum is sold direct to the farmer at varying prices depending upon location, grinding and packaging. The range is between $1.00 to $2.50 per ton. The average value of gypsum during recent years produced in California, according to producers' reports, is as follows:

Year	*Value per ton*
1939	$1.99
1940	1.90
1941	1.97
1942	1.86
1943	1.84

According to the U. S. Bureau of Mines [a] the value was higher.

This statement is as follows:

"The marked increase over 1942 in use of agricultural gypsum resulted from a 60 percent gain to approximately 293,000 tons consumed in California and a 30 percent increase to approximately 60,000 tons used in the Southeastern States. The average plant value of agricultural

[a] Gypsum 1943. Min. Market Rep. No. MMS 1192, U. S. Bur. Mines 1944.

gypsum was $2.25 per ton in California where sales were gypsite and $6.28 in the Southeastern States where rock and by-product gypsum are used.''

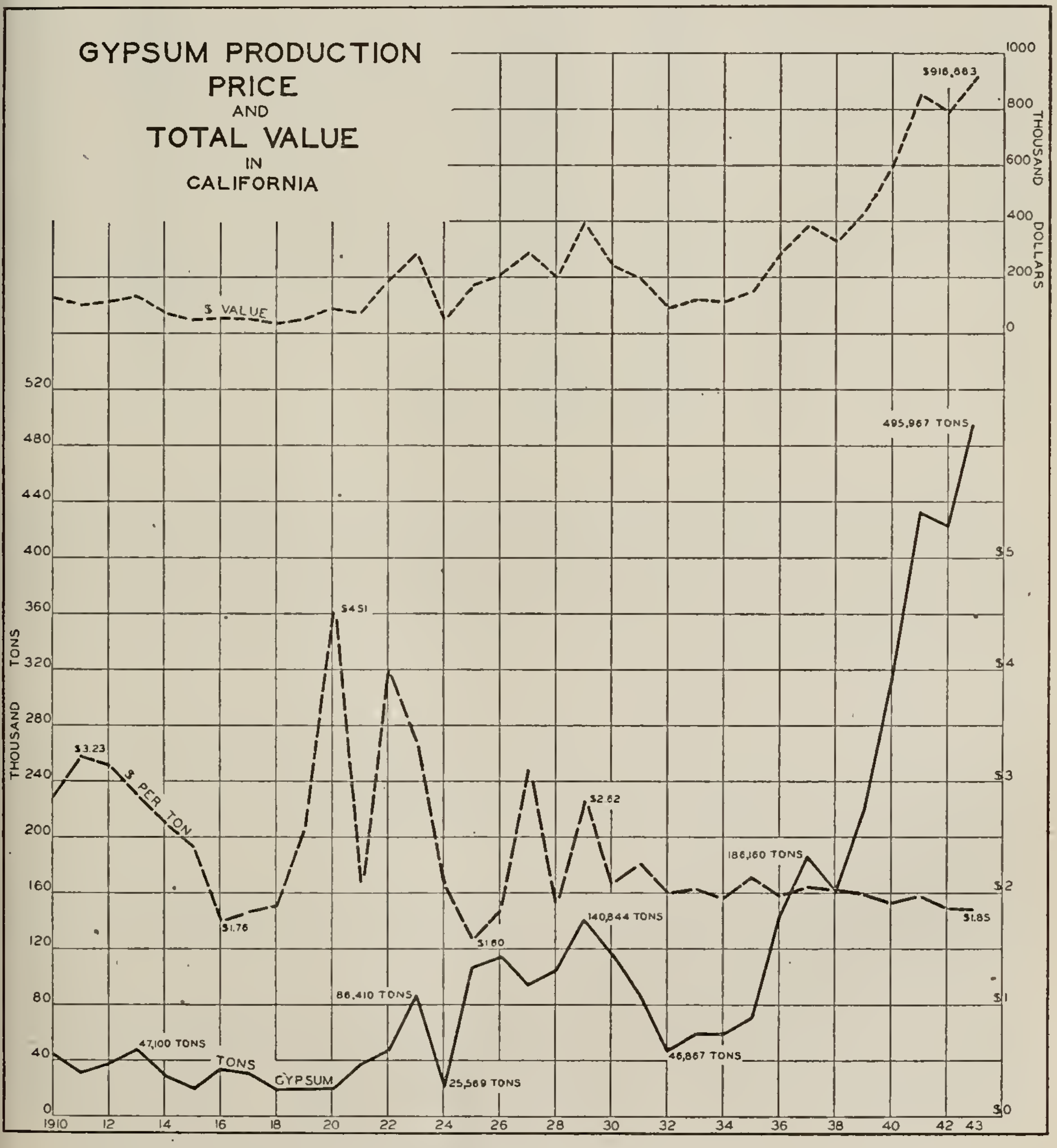
The reported average value for all States was $3.14 per ton.

The average price of calcined and other gypsum products is not available in California statistics. The average value derived from U. S. Bureau of Mines statistics for the whole country in 1943 was $9.50 per ton for building grades and $13.81 for industrial uses.

Character and Extent of Reserves

Gypsum deposits of satisfactory quality and size are common in so many parts of the United States that raw and calcined products are produced at points as close to markets as possible.

Extensive deposits of rock gypsum are found in Imperial, Inyo, Riverside and San Bernardino counties. The gypsum beds in Imperial County have a thickness of over 200 feet, those in Riverside County range from 10 to 100 feet and extend through the Palen and Maria



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Mountains. There are numerous deposits ranging from 6 to 10 feet thick and containing large tonnages.

Reserves are therefore obviously very large and can be classified as having adequate supplies for 50 years or more at the present rate of consumption.

Production

Only crude gypsum is reported in California statistics which are as follows:

Year	Tons	Value	Year	Tons	Value
1887	2,700	$27,000	1917	30,825	$56,840
1888	2,500	25,000	1918	19,695	37,176
1889	3,000	30,000	1919	19,813	50,579
1890	3,000	30,000	1920	20,507	92,535
1891	2,000	20,000	1921	37,412	78,875
1892	2,000	20,000	1922	47,084	188,336
1893	1,620	14,280	1923	86,410	289,136
1894	2,446	24,584	1924	25,569	53,210
1895	5,158	51,014	1925	107,613	172,444
1896	1,310	12,580	1926	114,868	211,337
1897	2,200	19,250	1927	94,630	292,090
1898	3,100	23,600	1928	104,790	200,567
1899	3,663	14,950	1929	140,844	396,951
1900	2,522	10,088	1930	116,865	243,507
1901	3,875	38,750	1931	88,354	199,198
1902	10,200	53,500	1932	46,867	93,818
1903	6,914	46,441	1933	59,235	120,451
1904	8,350	56,592	1934	58,149	113,606
1905	12,859	54,500	1935	70,833	151,807
1906	21,000	69,000	1936	143,549	282,703
1907	8,900	57,700	1937	186,160	384,431
1908	34,600	155,400	1938	161,996	327,821
1909	30,700	138,176	1939	219,672	437,343
1910	45,294	129,152	1940	314,843	599,944
1911	31,457	101,475	1941	432,784	854,184
1912	37,529	117,388	1942	425,268	791,892
1913	47,100	135,050	1943	475,967	916,883
1914	29,734	78,375			
1915	20,200	48,953	Totals	4,070,906	$9,299,995
1916	33,384	59,533			

Contrary to trend in the country as a whole, which has showed a decrease in most states, California production rose in 1943 notwithstanding that the number of active mines decreased from 9 to only 6. The increased production was largely in agricultural gypsum (land plaster) from Kern County.

Postwar Outlook. Employment

Postwar outlook, with resumption of building construction, is favorable, especially for calcined gypsum and products.

To what extent agricultural gypsum will be used at the present rate is uncertain.

California markets will probably again receive gypsum from Mexico, the operation on San Marcos Island, Baja California, having been purchased by the Kaiser interests.

Some new uses for industrial plasters have been developed which are expected to expand markets in the rubber and metal trades.

Increased residential construction is looked upon as likely to require large amounts of calcined gypsum and plaster board.

The industry during 1944 employed about 350 men and it is estimated that 500 will be required in the postwar period.

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IODINE

Iodine was first produced in California in 1917 from kelp on an experimental basis. In 1929 a plant was erected near Long Beach to extract iodine from the waste water of deep oil wells. Two plants were added in 1933 and production has averaged 385,165 pounds annually for the past 10 years.

The 1944 rate of production is perhaps 50 percent greater than this. The 1944 price was around $1.28 as against an average of about $1.23 per lb. for the 10-year period. The average value of output for 10 years has been $413,584 annually.

The industry employed around 53 men in 1943 as against 34 men in 1937-1938 and employment of a similar number may be reasonably expected in the postwar period.

Tariff Rates: Iodine, crude, is imported duty free.

IRON AND STEEL

By H. Foster Bain [1]

Iron and steel are key materials in modern industry. Without them neither tools nor machinery would be possible in the quantity and of the quality necessary to raise the standard of living above that of the subsistence level. Of the total metal production of the United States 90 per cent is steel, and mainly from it are manufactured the thousand and one comforts and conveniences which make our living so different from that of the Indians. The raw materials were all present in this country from the first. It is our capacity to make from them the things we demand and our will to do so which have made our life different from theirs. Further rise in the standard of living and even the maintenance of what we now have are dependent on our capacity to continue steel production. While California has a long and brilliant record as a metal producer, it has been but a minor producer of steel. Out of a total of 40,000,000 to 50,000,000 tons produced in the United States in a normal pre-war year, California furnaces turned out less than one million tons. The industries of the State were not, however, starved for steel, since the situation of its major cities on the coast made them easily accessible by sea and assured the State an ample supply at fairly low freight rates. Actually iron and steel products manufactured in

[1] H. Foster Bain, Mining Geologist.

California have been sold even in Pittsburgh, Pa., and numerous local specialties have found a market not only in the eastern states but abroad. From the point of view of employment the manufacture of steel into consumer goods is much more important than the making of steel itself from raw materials. Even in the rolling and finishing of steel about five times as many men are employed per ton of finished product as in the mining of the ore and the making of pig iron in the blast furnace. When a blast furnace is run to capacity, the labor cost is as little as 5 per cent of the total. In the steel mill it may rise up to 30 per cent. In manufacture of steel into consumer goods it is often 60 per cent and may run ever higher in making highly complicated or highly finished products. Clearly, if one considers employment only, it is much better to expend labor and capital on manufacturing of finished products than in working up local raw materials into iron and steel themselves.

Material cost does, however, enter into the cost of the finished products and labor employed in producing materials for manufacture is important. To the extent that raw materials are available and can be worked up at a cost less than that of steel made from materials elsewhere and imported, there is economic advantage to the State in putting them to use.

The raw materials used in important amounts in making steel are five: iron ore, coke, limestone or dolomite, scrap iron and steel, and fuel. All of these except one are present in California and are available at moderate to low cost. The exception is coke or coking coal, which is essential to the manufacture of pig iron but not steel. Pig iron, however, generally constitutes roughly half of the input of a modern steel furnace. Steel can be made entirely of scrap, and the first steel furnaces in California were fed on scrap alone. Pig iron was added to the charge whenever it was available at a competitive price and finally the Columbia Steel Company built a blast furnace at Provo, Utah, to furnish a regular supply. In American steel practice generally pig iron and scrap are used together with a small amount of high-grade hard iron ore, which is added to the open hearth charge to help the process by supplying oxygen to the bath. The ratio of pig to scrap is governed entirely by economic considerations. Steel can be made from either alone or from any intermediate mixture. On the Pacific Coast, up to now, the amount of scrap available has been so large in proportion to the steel locally made that the price has been approximately $4 per ton less than in competitive steel districts in the East. This has given the California steel plants a material advantage. To this has been added the cheap cost of fuel oil, the ideal fuel for open hearth, and, finally, to the extent of the local market, local steel mills have had an important advantage in freight rates in making deliveries.

Taking advantage of these local advantages small steel mills were built in both the San Francisco and Los Angeles districts and expanded as opportunity served until in 1939 steel ingots to a total of 658,801 tons were produced within the State. Most of this steel was made from scrap, the amount of pig iron introduced being small. That the plants were well conceived and are on a sound economic basis is evident from their persistence and growth through a considerable number of years including good times and bad. The individual works are, however, limited in capacity and in range of products. It is not possible to make large

shapes in a small mill nor is it economical to build a big mill for a small market. The California mills have properly enough been equipped with light to medium rolls and have been employed mainly in making light structural shapes and sheets. They have not been prepared to make heavy rails such as are now demanded by the railroads or heavy beams such as were used in building the Golden Gate and the San Francisco-Oakland bridges. Nor were they prepared to meet the demand for ship plate needed for the shipbuilding industry called into being by the present war. Within their limitations, however, these coast mills are good plants and have been able to hold their own in the local steel market against competition. So long as larger demand for scrap does not force up its price to where they will need an increasing amount of pig or hot metal they should be able to continue to do so. They are particularly able to survive through a depression period when the market calls for only limited amounts of any one product and orders come in small lots.

The demands of the war were, however, far above what Pacific Coast steel plants could supply, especially the call for ship plate and other forms of steel needed for the great shipbuilding industry which sprung up. Even before the war, demand for steel had grown to where it was a threat to the local scrap pile and the Columbia Steel Company, with works at Pittsburg and Torrance, had built a blast furnace at Provo, Utah, in order to assure its independence as to supply. Even this was not enough to meet war demands. Take the one item of ship plates. Before the war Pacific Coast consumption was 200,000 tons per year. The total demand for rolled products west of the Rocky Mountains had by wartime risen to 6,700,000 tons which, together with the closing of the Panama Canal to commercial traffic, threw a heavy burden on transcontinental railways. As these conditions became increasingly evident, strong measures were taken to build up local steel capacity and production with results as shown below.

California Ingot Steel

	Tons Capacity	Tons Production
1939	--------	658,801
1940	--------	775,401
1941	--------	911,015
1942	1,055,260	1,041,046
1943	1,470,450	1,368,199

These increases were made possible by enlargement of existing plants and by increasing the operating ratio. For California the latter was 95.3 percent in 1942, and 90.3 in 1943. For the United States as a whole the operating ratios for the two years were, respectively, 96.9 percent and 98.2. Evidently under Californian conditions it is possible to keep steel plants running on nearly as full time as elsewhere under the hardest driving. The production reflected in the above quoted figures was almost entirely from privately owned plants, though the Defense Plant Corporation did build a small addition to the Pittsburg plant of the Columbia Steel Corporation. The Reconstruction Finance Corporation did supply funds to Henry J. Kaiser's Fontana Steel Project for building in 1942 and 1943 a blast furnace and rolling mill which became the largest unit of production in the State and increased California capacity by approximately 50 percent. Owing chiefly to man-

power shortage the Fontana works was not able to reach full production in 1944, but it is designed to turn out 432,000 tons of pig iron and 700,000 tons of steel per year using scrap in normal ratio. It probably can be pushed to even higher limits. The main California production is from relatively small plants, some of which produce steel only for casting and forging. The complete list is given below, being as of the middle of 1944.

California Steel Plants

	Tons Capacity
Columbia Steel, owned by U. S. Steel Corporation	
Pittsburg works (for rolled products)	362,600
Pittsburg works for casting	24,000
Pittsburg works D. P. C. plant	30,000
Torrance works for rolled products	202,500
Torrance works for casting only	8,500
Bethlehem Steel Corporation	
San Francisco works	235,000
Los Angeles works	117,000
Judson Steel Company	
Oakland works	86,720
Pacific States Steel	
Niles works	86,400
National Supply Company	
Torrance works, for rolled products	40,500
Torrance works, for casting only	5,400
Kaiser Company Inc.	
Fortuna Works	700,000
Total	1,898,620

All but the Kaiser works were founded as small local plants for melting down and refining scrap. They have grown through the years and have been consolidated until now both the major steel corporations of the country, the United States and the Bethlehem, have important units of production, 627,600 and 352,000 tons, respectively, in the State. The largest capacity in the State, however, over a million tons, may be spoken of properly as independent. The capacity of the State as a whole exceeds that of several of the eastern steel producing states and is now about equal to that of Colorado or roughly two-thirds of that of Maryland. Clearly any threat to the continued prosperity of this steel industry is a serious matter.

It is not to be expected that the present heavy demand for steel in California, which is so largely concentrated on ship plates, will continue after the war undisturbed. It would seem probable that there will be a period of uncertainty and of less demand until alternative markets are built up and the plans reconverted to manufacture the products which the post-war market will demand. These depressions are fairly normal in the steel industry, which is notorious for being subject to wide variation in activity. In good times the works are pushed to turn out all the steel possible and in poor times the managers struggle to keep them going at all. In the past twenty years the operating ratio of the steel works of the whole country has varied from a low of 19.5 percent in 1932 to a high of 98.1 in 1943. The year 1937, when the ratio was 72.5 percent, was considered to be a good year and indeed when the ratio is 60 percent or better, as it has been in twelve of the past twenty years, steel is considered to be prosperous. In thinking, therefore, of future output in California it is more realistic to think of the need of a market for 1,200,000 tons per year than of 1,900,000 tons, the present total capacity. The periodic big demand for steel comes when economic conditions are favorable and the national mood is opti-

mistic so that increase in plant construction and permanent works is attractive. It must be remembered that the steel industry is not only a heavy industry but itself largely caters to the heavy industries. Bridges, roads, tools, buildings, plants, and equipment form major items in the demand for steel. Such demand is largely periodic rather than steady. At the same time a very large amount of steel flows into manufacture of consumer goods, such as tin cans, and into semi-durable goods, such as refrigerators, automobiles, farm machinery, office furniture and similar items. To maintain steady employment it is most important that manufacturing along these lines should be encouraged. It is true that much development remains to be done in California and in proportion to its area, population and wealth, industrialization is spread very thin over most of the State. The best lands are already being cultivated and the best sites occupied; so it is consumer goods that can best be relied upon to sustain the local steel industry. It is for the making of steel for the manufacture of such goods that the California mills are best adapted. It is questionable how far it would prove economical to expand in the direction of making rails and heavy shapes, though the Fontana plant can be easily adapted to such manufacture. The demand for heavy shapes is uncertain and irregular and, taking the country as a whole, the industry is overbuilt so that excessive competition would be met in marketing such products.

The western states call mainly for light structural shapes, rods, bars, light rails, angle bars, sheets, tinplate, tubular goods, wire and wire products. The average annual consumption of these in the seven western states through the ten years preceding the war was a little over 2,000,000 tons. Of this the largest single item was tubular goods, stimulated by the petroleum and hydro developments in the State, and of such goods there was virtually no local manufacture so that here is one gap to be filled if capital can be found to permit entering the field. The next largest item is tinplate, which with other sheets called for more than 600,000 tons per year. This affords a substantial nucleus for a continuous sheet mill such as will probably be built at Fontana or in the Geneva plant in Utah when that is converted to peacetime manufacture. Light rails, bars, angle bars, strips and light structural shapes, which constitute the rest of the local market, may be made by any of the local mills and steel for casting and forging is supplied in addition by works not connected with any rolling mills. The seven western states afford a market now for enough steel to keep all California plants busy to 60 percent capacity without venturing into new lines of manufacture and to the extent that the market lies in the State itself, and roughly 80 percent does, the local plants will have an advantage in delivery costs over any competition. These figures are based on pre-war consumption to which it will be fair to add some permanent increase as a result of the stimulation of the war and something for possible growth in exports.

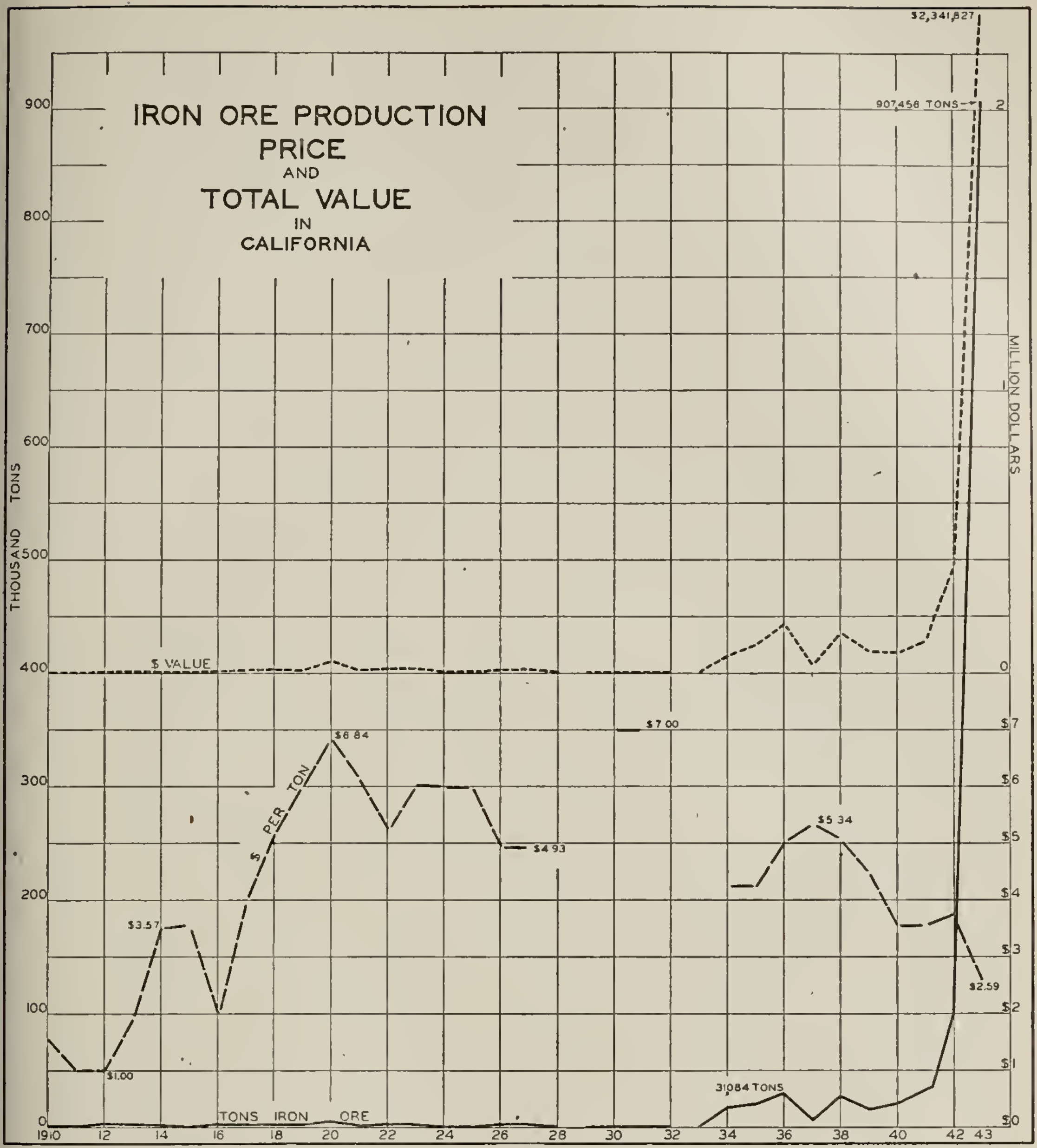
Approximately a million and a quarter tons of finished and semi-finished American steel is sold in Pacific-facing countries. About one-fifth of this is sold in Hawaii and Alaska, in which California producers have an advantage in freight rates. Whether or not they will find it possible to compete successfully in South American and Trans-Pacific markets will depend on many factors, all elements in international

trade. If there are heavy imports to California ports from the Orient, freight rates will favor return shipments, but, if it is the eastern rather than the western states which buy in the Far East, shipments direct to Atlantic ports will continue to grow as they have through a term of years and that in turn will favor exports by eastern rather than western manufacturers.

Tariff Rates: Iron ore, including manganiferous iron ore, is imported duty free. Iron in pigs and iron kentledge, not containing more than four-hundredths of 1 percent of phosphorus has an import duty of 75¢ per ton.

Some special consideration of the Fontana plant is perhaps called for, since it includes a blast furnace and so uses hot metal as well as scrap in making steel. It is a fine, modern, well-built plant and without the blast furnace would still be in excellent position to compete in making steel since it would have the same accessibility to markets and scrap supply which favor other California plants and would enjoy the same advantages of cheap fuel in the form of natural gas and petroleum, the latter being the preferred fuel for open-hearth furnaces. For such special steels as it is advantageous to manufacture in the electric furnace it further enjoys with its immediate competitors the advantages of abundant and reasonably cheap electric current. It would furthermore have the advantage of size over west coast competing plants, and the advantage of volume of production in lowering costs has already been indicated. Finally, it can deliver at virtual switching charge cost throughout the Los Angeles district and with proper organization of transportation at low water-rates to other coast districts, to Hawaii, and to Alaska. The Los Angeles market is at present the largest on the Pacific Coast, being somewhat larger than that in the San Francisco district. Hawaii is about equally accessible to both cities, while the Alaska market is reached most easily and cheaply from Seattle. Trans-Pacific countries are about equally accessible from Seattle, Portland, San Francisco, and Los Angeles.

The California steel plants will meet competition both from eastern plants, particularly those at Baltimore and Birmingham, shipping through the Panama Canal, and from the new plant at Geneva in Utah. The latter is an excellent modern works of such size and so situated as regards raw materials that with equal volume of production its manufacturing costs should be comparable to those of eastern and middle western competitors. It will necessarily depend to a considerable degree on the coast states for its markets and in reaching them it seems probable that its freight rates will be competitive to those of the eastern companies, even using their own ships and travelling through the Panama Canal. This should still leave Fontana a definite margin in the Los Angeles market, a slight margin in San Francisco and equality elsewhere, assuming that its costs can be brought down to a level comparable to those at Geneva. This will depend first on volume of business, which depends to a large extent on management and salesmanship, and next on cost of its hot metal or pig iron.



Accompanying "Economic Mineral Resources and Production in California," California Division of Mines Bulletin 130

The cost of pig iron, or of hot metal which is now more commonly used in making steel, depends upon (a) assembly cost of raw materials; (b) conversion costs, largely influenced by volume of production, and (c) capital charges. The raw materials which are important are iron ore, coke and flux. There are other items to be considered including manganese, sometimes silica, and refractories. Iron ore and coke are the chief elements. Fontana now draws its supply of iron ore from the nearby Vulcan mine. Open-pit mining and a short haul permit delivery to the furnace site of a unit of iron at very favorable rates. The ore averages a little better in metallic iron than that now delivered from the Lake Superior mines but in other particulars is not so good, being less regular in quality and containing a small but variable amount of sulphur, which is troublesome. These difficulties are minimized by use of an excellent bedding and reclaiming system at the furnace and by screening out and sintering the fine material.

The Vulcan mine does not contain a sufficient reserve to sustain the Fontana furnace for more than a few years but it is ample to provide the necessary ore until after the war, when the Eagle Mountain deposit, 14 miles northwest of Desert Center in Riverside County, can be equipped and brought into production. The Eagle Mountain deposit is the largest known in California. It has been drilled by the U. S. Bureau of Mines and the Kaiser Company Inc. and a reserve of somewhere between 50,000,000 and 70,000,000 tons, depending on the grade taken as a base, has been developed. The ore is of the same character as that at the Vulcan mine and at Iron Mountain in Utah and is subject to the same drawbacks. It lies, however, favorably to open-pit mining and, while it is about 100 miles from the furnace, it should afford cheap ore.

The fee to the land is owned by the steel company but the Riverside Iron and Steel Company holds a short-time lease on the mine and adjustment of relations between lessor and lessee is still to be made. With this property in the ownership of the steel company the latter has a permanent advantage in cost of its iron. The Kaiser company also has options on other orebodies in California and Utah.

Fontana is not so favorably situated as regards its coking coal. The company owns a mine in the Sunnyside coal field in Utah and draws most of its supply from there. The mine is new and the coal in which it has been working, being near the outcrop and so having been subjected to considerable oxidation, is of lower coking quality than the expected average. Owing to war conditions it has not been possible to work either the mine or the furnace at full capacity; so costs have been disappointingly high. In addition, the coal is hauled 810 miles from mine to coke oven and has to carry a freight charge of $4.35 per ton. Another handicap that must be met by all who coke Utah coal is the absence of any local and suitable supply of low-volatile coal to mix with it and so improve the quality of the coke. This mixing of low-volatile with high-volatile coal in making coke is now standard practice. While Utah coal can be coked alone, it makes a fragile coke with a disappointing percentage of fine and intermediate sizes. There is not in the west as good a market as in the east and middle west for these intermediate sizes and so far the best use for this coke that has been found is to screen it out, crush it, and use it to sinter the fine ore as already mentioned. At the Fontana furnace low-volatile coal is imported from Oklahoma to mix with the Sunnyside coal. This markedly improves the quality of the coke but with just what ultimate economy remains to be determined. It is to be expected that some of these difficulties will be met as time passes and more experimental work is conducted, but it is hardly likely that the Fontana plant will ever come to have coke as cheap as that at eastern and middle western furnaces. The amount of the handicap may, however, be expected to be reduced. The cost of the small amount of manganese ore needed, which comes from California mines, or of limestone for flux is not high and affords no handicap.

The cost of converting the raw materials into hot metal or pig is not particularly out of line at Fontana. The usual by-products are derived from the coke ovens apparently in normal quantities and sold for at least normal prices. The only unusual practice is the large amount of ore put through the sintering process before it goes to the

blast furnace. This naturally adds to the cost, but the careful conservation of water, of heat, and of surplus gas, all of which is possible with a modern blast furnace integrated with a steel works, reduces the cost of the hot metal. As usual, one of the large factors in cost is the overhead and this, per ton, depends mainly upon the rate of production. It has already been stated that the plant at first was not able to operate at capacity, mainly because of lack of manpower. Even so, the cost per ton of pig iron has been within the range of sale price for similar iron in the eastern States. It would not seem beyond the range of managerial capacity to so reduce this as in time to give Fontana a margin of gross profit comparable to that of its competitors, but, even if its hot metal cost should remain permanently a bit high, the otherwise favorable situation of the works should enable it to deliver steel to the extent of its local market to advantage. For the long time future, the location of the plant virtually on the seacoast offers large possibilities such as have contributed so greatly to the success of the Sparrows Point works of the Maryland Steel Company.

In one particular the Fontana works is at a disadvantage and the same thing applies to the Geneva works in Utah; that is that each faces a heavy capital charge from the first. Comparable works in the eastern states have been built up little by little through a term of years and have mainly been financed through earnings. Their financial charges grew only as their output grew. With the exception principally of the Gary steel works, none of the major plants were created all at once and Gary, of course, was but one new unit of the United States Steel Corporation and had back of it the established earning power of many other departments or plants as well as a well-organized sales force. Fontana has the latter still to create and $106,000,000 has been put into the plant all at once. This was because of the war demand for ship plates. Additional money will be needed to convert the plant to peacetime uses by adding a tube works, a rail mill, a sheet and tinplate finishing plant or other departments. Some accommodation will have to be made to balance the cost of wartime construction and the overdevelopment of certain departments to meet a war need, and time will have to be granted to build up markets. If this can be done, there seems to be no inherent reason why Fontana may not be a permanent and fairly steady contributor to the prosperity of the State.

Aside from the existing plants, there is no present reason for building more nor is there reason to anticipate new works of size. The handicap due to absence of coking coal has perhaps been sufficiently indicated. Attention should perhaps also be called to the absence of any known iron-ore deposits, aside from those at Eagle Mountains, which are of sufficient size to furnish enough ore through a term of years long enough to amortize the cost of a modern steel works. Such a plant calls for the investment of $100,000,000 to $200,000,000 and this cannot be amortized by a charge on any but a large body of ore. If, instead, it be planned to import ore, the charge must nonetheless be met even though it be not apparent, and to it would need to be added the cost of transport and other charges incidental to imports.

There are numerous small bodies of iron ore throughout the State. Some are too inaccessible to be mined and shipped with profit and are too far from fuel and market to be worked where they lie. Others

find a limited market in supplying iron ore for use in making low-temperature cement or for ballast in newly built ships. At present these markets build up to a possible half million tons per year. An additional market for high-grade ore only which does not seem to have been adequately exploited would be in supplying ore to the open-hearth furnaces for ''oreing down'' the charge. There is a possible market here for as much as 100,000 tons.

In Shasta County various attempts have been made to make pig iron or steel from local ores by use of electric furnaces. So far such attempts have failed by reason of high cost. It is possible that a limited industry may be built up there or elsewhere by making of special grades of alloy steel or ferrous alloys which by reason of their quality can be sold at high prices. The market for such products, however, is limited and electric furnace manufacture of steel must always face the difficulties and costs in the way of excess labor, higher heat losses, big overhead and similar charges incident to small-scale manufacture. It is much cheaper to manufacture anything in a blast furnace that can be made in it. To equal output of the Fontana furnace would require a dozen or more of the largest electric furnaces now in use and the cost per ton of output would be sure to be high. A similar situation exists as to employment of any of the so-called sponge-iron or direct reduction processes, none of which has equaled or seems likely to equal the low costs obtained in furnaces of standard design. Californians would seem wise to continue to capitalize on their cheap fuel, cheap electric current and local markets by using standard methods of metallurgy. Using these methods plants capable of producing as little as 6000 and as much as 600,000 tons per year are already in operation. This would seem to afford a sufficient range for making of iron and steel, the basic materials of industry.

It may be repeated that with the materials and facilities available in California, with the year-round climate, the high standard of living, the large opportunity is in making things out of steel rather than over-developing the making of steel itself. It will be wiser to give the existing plants a chance to sustain themselves and to grow with the State than to overinvest in development of raw materials even where the latter are to be had. This can be made the road to greater and steadier employment and to increasing prosperity.

Employment

Iron Ore Mining

There were in October, 1944, 170 persons employed in mining iron ores for use in the iron blast furnace at Fontana, for ship ballast and for special cements. After the war there will be little demand for iron ores for ballast and it is believed that blast furnace production will be curtailed. In view of these changes post-war activities cannot be expected to employ over 100 persons.

Blast Furnaces and Steel Mills

Industries comprising the group classified as Blast Furnaces, Steel Works and Rolling Mills, employed an average of 15,000 persons in California in 1944, according to estimates of authorities. No breakdown is available showing the number employed in blast furnace operations alone.

It is anticipated by the same authorities that decreased demand for such wartime products as ship plates will bring about a curtailment in activities which will result in a reduction in the employment figure to about 10,000.

LIME, LIMESTONE AND DOLOMITE

By Roy E. Tremoureux [1]

Limestone is calcium carbonate, one of the most plentiful of minerals. Dolomite, the double carbonate of calcium and magnesium, is abundant in many places in the State.

Lime is the calcined product of limestone, but the term is also applied to calcined dolomite.

Most limestone contains magnesia, the amount ranging from a low percentage to high-magnesia limestone called dolomitic limestone. Similarly, the term dolomite is applied to materials varying widely in lime content.

Because of these gradations and the lack of any clear line of demarcation between the various grades and the fact that they are, to some extent, used interchangeably, the three subjects, Lime, Limestone and Dolomite, have been combined in this chapter.

Limestones and dolomite are found in 52 of the 58 counties in California. They are not reported in Del Norte, Kings, Modoc, Sacramento, Stanislaus or Tehama counties.

The leading producers in 1943 in order of importance were in Santa Clara, El Dorado, Tuolumne, San Bernardino and San Mateo counties. Production also came from Inyo, Santa Cruz, Los Angeles, Riverside and Ventura counties.

In addition to limestones included in this chapter, large quantities are produced for the manufacture of cement and small quantities for roads and building construction.

Uses

Limestone and dolomite are sold in the crude, crushed or powdered form and a considerable amount is calcined by the producer, and sold as lime.

Lime

The open-hearth steel industries consume 35 percent of the lime in California; building lime, brick mortar, plaster, stucco and concrete admixture consume about 25 percent of the lime sold; fruit sprays, water softening, magnesia compounds, carbide manufacture, oil and grease and sugar purification, paper and many smaller users consume 40 percent of lime sold. Dolomitic lime used in magnesium and magnesia manufacture are not included in the above percentages.

Limestone

There are a multitude of uses for limestone, most of which fall into one of three classes: agricultural, construction and industry.

In agriculture, its chief functions are to reduce soil acidity; to supply calcium as plant food; to granulate soil; to increase the efficiency of fertilizers; and to counteract certain soil poisons.

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In construction, aside from its use as an aggregate, limestone is used in stucco and as a roofing material.

In industrial and chemical fields, it has various applications; as a flux in blast furnaces and steel foundries, paint filler, and large quantities are used in glass, sugar and soda-ash manufacture, and animal foods, in addition to many smaller users.

Dolomite

Most of the dolomite produced prior to 1942 has been used crude as a refractory material in open-hearth steel furnaces and calcined dolomite (dolomite lime) has been used in the manufacture of paper from wood pulp and in the manufacture of dolomitic hydrate for plastering purposes. Starting in 1942 large quantities of calcined dolomite have been used in the manufacture of magnesium metal using the ferro-silicon process and in the extraction of magnesia from sea water.

Markets. Prices

Lime

Building lime is sold through building material dealers; all other lime is sold mainly direct to the consumer.

Building lime is usually sold on the basis of its yield and plasticity and not on chemical analysis or fineness.

All other limes may have definite specifications: as to the calcium, magnesium, silica, sulfur and phosphorous content and in many cases the size — whether lump, rotary-kiln size, 16-mesh or, in the case of hydrates the fineness thru 200- and 300-mesh screens.

The value f.o.b. plants varies according to specifications, and averaged $10.68 per ton in 1943.

Limestone

Industrial limestone is usually sold direct to the consumer.

Agricultural limestone is generally sold by dealers in fertilizers and other agricultural products.

Prices vary widely due to its varied fineness of grinding and exactness of analysis, and averaged $2.78 per ton in 1943.

Dolomite

The open-hearth steel companies have been the principal users of dolomite until 1942 and 1943 when large quantities of calcined dolomite found its way into the magnesium metal and magnesia products industries.

Value per ton of dolomite was $1.42 in 1943. Most of this tonnage was calcined before shipment.

Tariff Rates

Lime, not specially provided for has an import duty of 5c per 100 lbs., including weight of container.

Limestone (not suitable for use as monumental or building stone) crude, or crushed but not pulverized has an import duty of 2½c per 100 pounds.

Dolomite is imported duty free.

Limestone

Large quantities of limestone, including oyster shells, are used in cement manufacture and this tonnage is included in the Division of Mines statistics under cement. Stone from limestone quarries used for road construction is excluded in the following tabulation. It is, however, included in the statistics of Miscellaneous Stone.

Limestone Production in California, by Years

Year	Limestone burned into lime, tons	Other limestone, tons	Total tons
1894	74,700	15,420	90,120
1895	79,552	71,355	150,907
1896	60,550	68,184	128,734
1897	57,560	36,796	94,356
1898	59,572	27,686	87,258
1899	59,970	30,769	90,739
1900	62,504	32,791	95,295
1901	63,476	76,937	140,413
1902	89,732	71,422	161,154
1903	99,318	125,919	225,237
1904	115,890	40,207	156,097
1905	123,400	192,749	316,149
1906	137,854	80,262	218,116
1907	136,844	230,985	367,829
1908	79,278	273,890	353,168
1909	104,150	337,676	441,826
1910	95,902	684,635	780,537
1911	85,918	516,398	602,316
1912	104,424	613,375	717,799
1913	122,688	301,918	424,606
1914	87,992	572,272	660,264
1915	71,306	146,324	217,630
1916	98,728	187,521	286,249
1917	100,146	237,279	337,425
1918	87,368	208,566	295,934
1919	84,140	88,291	172,431
1920	92,628	90,120	182,748
1921	92,706	75,921	168,627
1922	115,750	84,382	200,132
1923	141,788	143,266	285,054
1924	124,058	219,476	343,534
1925	123,984	319,977	443,961
1926	127,136	108,795	235,931
1927	120,996	699,790	820,786
1928	113,232	127,895	241,127
1929	85,668	168,315	253,983
1930	95,324	169,477	264,801
1931	72,378	177,268	249,646
1932	55,020	168,950	223,970
1933	66,850	207,371	274,221
1934	65,000	198,057	263,057
1935	119,462	227,214	346,676
1936	128,550	295,792	424,342
1937	139,064	351,755	490,814
1938	141,156	302,665	443,821
1939	174,576	316,029	490,605
1940	202,790	563,999	766,789
1941	221,438	459,153	680,591
1942	197,096	277,668	474,764
1943	172,664	322,598	495,262
Totals	5,332,276	11,344,550	16,676,826

Character and Extent of Ore Reserves

Limestone and Dolomite

Reserves of limestone and dolomite at operating plants at present output are sufficient for 20 years. However, new deposits located at higher freight rates from markets may be opened and this would increase these reserves sufficiently for another 50 years.

Production

Lime

Lime is produced from limestone and dolomite and subsequently a considerable portion of the lime is hydrated at the producing plants. In the statistics given below no dolomitic lime or hydrate tonnages are included. Other so-called captive tonnages are included. Division of Mines tonnages of lime produced are given in the following table:

Total Production of Lime in California, by Years

Year	Tons	Value	Year	Tons	Value
1894	37,350	$318,700	1919	42,070	$552,043
1895	39,776	386,094	1920	46,314	557,232
1896	30,275	261,505	1921	46,353	610,619
1897	28,780	252,900	1922	57,875	671,747
1898	29,786	254,010	1923	70,894	788,834
1899	29,985	314,575	1924	62,029	703,355
1900	31,252	283,699	1925	61,922	685,528
1901	31,738	334,688	1926	63,568	670,837
1902	44,866	369,616	1927	60,498	631,497
1903	49,659	418,280	1928	56,616	547,919
1904	57,945	571,749	1929	42,834	417,101
1905	61,700	555,322	1930	47,662	452,084
1906	68,927	763,060	1931	36,189	360,523
1907	68,422	756,376	1932	27,510	254,223
1908	39,639	379,243	1933	33,425	271,619
1909	52,075	577,824	1934	32,500	309,765
1910	47,951	477,683	1935	59,731	573,212
1911	42,959	390,988	1936	64,275	633,678
1912	52,212	464,440	1937	69,532	681,277
1913	61,344	528,547	1938	70,578	683,403
1914	43,996	378,663	1939	87,288	849,122
1915	35,653	286,304	1940	101,395	902,322
1916	49,364	390,475	1941	110,719	996,514
1917	50,073	311,380	1942	98,548	961,803
1918	43,684	461,315	1943	86,332	922,800
			Totals	2,666,168	$26,176,493

Dolomite

The following tabulation of dolomite production includes the tonnage used for calcined dolomite. No segregation is made as data furnished by the two calcining operations are confidential.

Total Production of Dolomite in California, by Years

Year	Tons	Value	Year	Tons	Value
1915	4,192	$14,504	1930		
1916	13,313	46,566	1931*	66,564	$161,245
1917	27,911	66,416	1932	35,275	40,956
1918	24,560	79,441	1933	54,456	176,575
1919	24,502	67,953	1934		
1920	42,388	132,791	1935*	108,645	304,984
1921	31,195	99,155	1936	25,807	63,102
1922	52,409	114,911	1937	12,371	24,632
1923	69,519	142,615	1938	4,363	18,339
1924	28,843	71,271	1939	17,791	40,391
1925	42,852	104,900	1940	18,178	52,167
1926	68,640	119,313	1941	22,300	64,595
1927	45,976	79,442	1942	142,552	413,469
1928	38,379	85,342	1943	331,251	472,756
1929	58,644	156,928	Totals	1,512,876	$3,214,750

Costs

Lime

Costs of producing lime in the Pacific Coast states are high due to small individual plant tonnages, high delivered costs on fuel and supplies. Freight rates to market are also higher than in the east and middle west so that delivered prices are considerably higher than elsewhere in the United States. Actual cost per ton figures are not available.

Limestone and Dolomite

High costs prevail in the limestone and dolomite production due again to relatively small individual plant tonnages and distances from the major markets. The large tonnage of dolomite produced in 1943 would show a considerably lower cost.

Postwar Outlook

Lime—Limestone—Dolomite

Increasing demand for these products will force the existing companies to enlarge their plants and modernize them.

Possible Postwar Employment

Lime—Limestone—Dolomite

During 1943 there were an estimated 400 employees in these operations: 300 in lime and limestone operations, and 100 in dolomite operations. It is estimated the lime and limestone industry may increase its employment by 100 employees in the post-war period.

References:

Bowles, Oliver and Myers, W. M. Limestone—I Gen. Inform. Inf. Cir. 6723. U. S. Bur. Mines, 1933.

Eckel, E. C. Cements, Limes and Plasters. John Wiley & Son. 1928.

The Structural and Industrial Materials of California. Bull. 38. Cal. Div. Mines. 1906.

National Lime Association. Various Publications.

Bowles, Oliver, and Banks, D. M. Lime. Inf. Cir. 6884 R. U. S. Bur. Mines. 1941.

LITHIUM

Lithium is the lightest of all metals, weighing 33.3 lbs. per cubic foot. This is less than one-third the weight of magnesium.

Lithium-bearing ores, lepidolite, amblygonite and spodumene, are found in San Diego, Inyo and Riverside counties. Amblygonite contains 8–9 percent lithium oxide, lepidolite about 3 percent and spodumene, 4 percent Li_2O.

It has been known to occur in the brines at Trona, San Bernardino County, for some years, being present in an amount equal to 0.15 percent Li_2O. The product recovered from the brine as lithium sodium phosphate however contains about 22 percent Li_2O, and as such is the highest grade raw material available for the production of lithium and its compounds.

Uses

It is used as a scavenger in preparation of other metals in radio and fluorescent tubes, as an alloy with lead, copper, aluminum, magnesium and other metals, in foundries for degasifying castings.

Lithium compounds have widespread uses, a promising outlet being in air-conditioning. Lithium bromide and chloride are used for this purpose because of their hygroscopic properties. The oxide is used in submarines for removing carbon dioxide from the air, and the hydrite is provided on life rafts for inflating signal balloons.

The chief use of unrefined lithium ores is in the ceramic industries.

Markets. Prices

There is no open market for lithium products, sales usually being made direct to the manufacturer.

The price of lithium metal was $96 per lb. in 1929 but dropped to $15 per lb. in 1932 where it has since remained.

Ores are currently quoted f.o.b. mine as follows:

Spodumene per unit Li_2O—6% grade	$5– $6
Amblygonite per ton 8–9% Li_2O	$40–$50
Lepidolite per ton—ordinary grades—lump	$24–$25

Tariff Rates

Lithium has an import duty of 25 per cent ad valorem.

Character and Extent of Reserves

These minerals found in pegmatites are of irregular occurrence, and no estimates of available reserves are possible.

The amount of lithium salts in Searles Lake is large, but production is necessarily limited by the size of other operations as lithium is recovered as a by-product.

Total Production of Lithium in California, by Years

Year	Tons	Value	Year	Tons	Value
1899	124	$4,600	1923	----	----
1900	440	11,000	1924	169	$2,269
1901	1,100	27,500	1925	----	----
1902	822	31,880	1926, 1927, 1928	550	13,900
1903	700	27,300	1929	----	----
1904	641	25,000	1938, 1939	378	100,338
1905	25	276	1940, 1941	366	84,099
1906	----	----	1942, 1943	581	114,138
1915	91	1,365	Totals	23,200	$716,211
1916	71	1,065			
1917	880	8,800			
1918	4,111	73,998			
1919	800	14,400			
1920	10,046	153,502			
1921, 1922	1,365	20,781			

* Annual details concealed under 'Unapportioned.'

Postwar Outlook

The increasing demand for lithium and its compounds may expand search and operations.

The United States Bureau of Mines has developed a method of extracting lithium from amblygonite and plans now to build a pilot plant for this purpose at Minneapolis.

In the event this work discloses economic possibilities, the lithium mineral deposits of Riverside and San Diego counties should be re-examined to determine their possible extent and quality.

But few men are at present employed directly in these operations.

References:

Roe, Lawrence A., Wartime Demand Stimulates Lithium Production. Presented at Los Angeles Oct. 1944 meeting of A.I.M.E. Unpublished.

Information Circular 7054. U. S. Bur. of Mines.

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MAGNESITE AND MAGNESIUM COMPOUNDS

By S. R. Coghlan *

Magnesite

Magnesite has been found in many parts of California because of the great areas of serpentine of which it is an alteration product. Although deposits have been reported in 23 countries, less than half of these have produced sizeable tonnages. The period of maximum activity of the industry extended from 1916 through 1920 when European shipments were shut off and production of steel was greatly increased.

During these years and the few following, most of the commercial deposits were worked out until, in 1942 and 1943, there were only two producing mines in the State, the Western Mine in Santa Clara County and the Bald Eagle Mine in Stanislaus County. Both were operated by Westvaco Chlorine Products Corporation. Because of exhaustion of the orebody the Bald Eagle Mine is being closed down. The Western Mine continues to operate with about 12 employees and there is no postwar plan for any increase in this number.

In California, sea-water magnesia has replaced the product of the magnesite mines for most uses and only the discovery of a large high-grade deposit of magnesite is likely to bring about a resumption of mining in the State.

Sea-Water Magnesias and Other Compounds

Six plants are in production in California (1944) using sea water or bitterns. These are as follows:

Alameda County: Westvaco Chlorine Products Corporation plant at Newark, producing a wide variety of magnesias and periclase from bitterns obtained from adjacent salt works and calcined oyster shells.

* Metallurgical Engineer.

Total Magnesite Production of California, by Years

Year	Tons	Value	Year	Tons	Value
1887	600	$9,000	1916	154,052	$1,311,893
1888	600	9,000	1917	209,648	1,976,227
1889	600	9,000	1918	83,974	803,492
1890	600	9,000	1919	44,696	452,094
1891	1,500	15,000	1920	83,695	1,033,491
1892	1,500	15,000	1921	47,837	511,102
1893	1,093	10,930	1922	55,637	594,665
1894	1,440	10,240	1923	73,963	946,643
1895	2,200	17,000	1924	67,236	900,183
1896	1,500	11,000	1925	64,623	872,944
1897	1,143	13,671	1926	50,915	587,642
1898	1,263	19,075	1927	46,093	577,887
1899	1,280	18,480	1928	45,645	501,590
1900	2,252	19,333	1929	47,269	488,014
1901	4,726	43,057	1930	38,681	388,472
1902	2,830	20,655	1931	21,576	182,283
1903	1,361	20,515	1932-1933	40,303	282,325
1904	2,850	9,298			
1905	3,933	16,221	1934-1935	62,509	413,228
1906	4,032	40,320			
1907	6,405	57,720	1936-1937	94,491	734,443
1908	10,582	80,822			
1909	7,942	62,588	1938-1939	47,954	375,005
1910	16,570	113,887			
1911	8,858	67,430	1940-1941	103,457	886,005
1912	10,512	105,120			
1913	9,632	77,056	1942-1943	60,951	566,769
1914	11,438	114,380			
1915	30,271	283,461			
			Totals	1,695,168	$16,684,656

D. P. C. plant at Newark, producing a magnesia catalyst for use in the manufacture of synthetic rubber.

Monterey County: Permanente Metals Corp. plant at Moss Landing producing various grades of magnesia and periclase. Sea water and calcined dolomite are the principal raw materials.

San Diego County: Westvaco Chlorine Products Corporation's plant producing magnesium chloride solution for use with oxy-chloride cement. The principal product of this plant is bromine.

San Mateo County: Marine Magnesium Products Corp. at South San Francisco produces magnesium carbonate, magnesium oxide, U.S.P., and magnesium hydroxide in both powder and paste.

Plant Rubber and Asbestos Works at Redwood City produces basic magnesium carbonate for its Redwood City and Emeryville manufacturing plants.

Uses. Markets

For many purposes products from natural and synthetic sources are interchangeable although those made from sea water are considered more desirable for most uses. They contain less impurities and the product can be prepared with greater uniformity.

No attempt is made in the following paragraphs to specify which raw material was utilized in the preparation of products.

The following are the principal products of the California plants and a short description of their uses:

Hard-burned magnesia, ignition loss about 0.4%, headed the tonnage list of products in 1943. It is the principal product of the Moss Landing Plant of the Permanente Metals Corp. and furnishes the raw material for this company's carbothermic magnesium plant near San José.

Other products and their uses are listed but no attempt is made to place them in the order of their importance. Some of these are made with the addition of silica, alumina, iron oxide, lime, etc., in powdered form during the process of manufacture and before final calcination.

Dead-burned magnesia for refractory use either in bulk or pressed into brick: Largest consumers are open-hearth steel furnaces. Copper smelters and refineries are the next largest users.

Periclase, a magnesia-silica mixture calcined at high temperatures: Principal use is for refractory brick. The Permanente Metals Corp. in 1943 manufactured periclase brick at a small plant at Milpitas, Santa Clara County, and has started construction of a large installation adjoining its sea-water magnesia plant at Moss Landing.

Caustic-calcined, or light-burned, magnesia is produced in many grades, with a corresponding variety in the percentages of ignition loss. Westvaco Chlorine Products Corporation at Newark, Alameda County, is the principal producer. Distinct grades are offered for the following uses: compounding rubber, both natural and synthetic; oxy-chloride cement for flooring, rayon manufacture, paper manufacture, fertilizer, raw material for miscellaneous magnesium compounds and a variety of smaller uses which is constantly enlarging.

Basic magnesium carbonate, product of Plant Rubber and Asbestos Works, is used for the manufacture of insulating materials.

The U. S. P. products of the Marine Magnesium Products Corp. which uses bitterns and lime as raw materials, are used in medicinal and pharmaceutical preparations. This company also offers products for industrial uses.

Production

The following tabulation shows production of sea water magnesium compounds and includes products of plants using either sea-water or salt-works bitterns, and either calcined dolomite, calcined oyster shells or lime as the precipitative agent.

Total Production of Magnesium Compounds in California, by Years[1]

Year	Tons	Value	Year	Tons	Value
1916	851	$6,407	1931, 1932	2,749	$217,979
1917	1,064	34,973	1933	2,073	159,660
1918	1,008	29,955	1934	2,325	194,642
1919	1,616	82,457	1935	2,785	235,531
1920	3,150	107,787	1936	3,798	347,838
1921	4,153	106,140	1937	3,867	316,669
1922	3,036	89,788	1938	24,176	469,636
1923	3,662	116,031	1939	17,668	754,457
1924	4,823	145,883	1940	26,319	1,077,966
1925	4,221	132,553	1941	31,751	1,606,872
1926	4,881	124,470	1942	37,363	2,088,917
1927, 1928	6,241	139,589	1943	69,686	3,868,716
1929, 1930	4,914	333,906	Totals	268,180	$12,788,822

[1] Production of D. P. C. plant at Newark not included.

Prices

Quoted by U. S. Bureau of Mines for 1943.
Per ton—carload lots f.o.b. California.

Caustic calcined magnesite, bulk	\$52.75;	powdered,	\$58.75
Calcined (sea water) magnesite, bulk	54.00;	"	60.00
Periclase—mined, 85%	38.24;	90%	40.50
Periclase—sea water, 85%	36.00;	90%	36.50

Above are for commercial grades.

Postwar Outlook

Sea-water magnesia in California is a growing industry. A large amount of research work has been done and is continuing by producing companies in the development of new uses and improved methods of preparation. Increased facilities for brick making, manufacture of insulation, chemicals, etc., should increase demands for the products of the industry.

Large deposits of magnesite, or magnesite-bearing sedimentaries, are known to exist at Bissell and Kramer in Kern County and in the eastern part of San Bernardino County. Extensive research has been done on the treatment of the Bissell material and plans have been made for its possible utilization in the postwar period.

It is estimated that between 450 and 500 persons are employed in the production and preparation of magnesium compounds. Some reduction of operations is anticipated by the companies at the end of the war, due to curtailment of steel, and possibly, magnesium metal, production. However, it is believed that the pre-war trend of increasing tonnages will continue and with it increased employment not only in the production of magnesium compounds but also in the manufacture of products for the ultimate consumer.

Tariff Rates

Crude magnesite has an import duty of $\frac{15}{32}$ of 1c per lb.; caustic calcined magnesite, $\frac{15}{16}$ of 1c per lb.; dead burned and grain magnesite, and periclase, but suitable for manufacture into oxychloride, cements, $23/40$ of 1c per lb.

Magnesium Compounds: Carbonate, precipitated, 1c per lb.; chloride, anhydrous, 1c per lb.; chloride, not specially provided for, $5/8$ of 1c per lb.; sulphate or Epsom Salts, $3/4$ of 1c per lb.; oxide or calcined magnesia, 5c per lb.

References:

Magnesite; Mineral Abstracts. Cal. Div. of Mines. Unpublished.

Industrial Minerals and Rocks. A. I. M. E. 1937.

Minerals Yearbook. U. S. Bur. of Mines. 1943.

MAGNESIUM

The production of primary magnesium in California was a wartime development and two plants were constructed for this purpose. Both were operated by The Permanente Metals Corporation.

One plant, located at Permanente, Santa Clara County, 12 miles west of San Jose, began operation late in 1941 and uses a carbothermic reduction process.

The other plant operated by Permanente is a Defense Plant Corporation enterprise located at Manteca, San Joaquin County, and used the Pidgeon ferrosilicon process. Production at this plant began in August 1942, and stopped when the plant was closed down in May 1944. It was at this time that over-production in the industry started general curtailment of output in practically all American plants.

Uses

Less than 10 percent of all magnesium produced in the United States was used as the pure metal. Pyrotechnics consumed practically all pure metal for tracer bullets and magnesium flares. Photographic flash bulbs use a small part.

Of the 1942-1943 production, about 80 percent was used for the manufacture of magnesium-base alloys and 10 percent in other alloys, chiefly aluminum. Virtually the entire tonnage of the alloys was channeled into military uses for the production of airplanes and incendiary bombs.

During the latter part of 1943 and the first 8 months of 1944, Permanente produced very little refined magnesium. Practically all of its output was made into ''Goop,'' an oil-magnesium mixture for filling large incendiary bombs. The plant resumed refined metal production in September 1944.

Markets

Until October 3, 1944 all the magnesium produced in the United States was earmarked for war use. On that date WPB lifted restrictions and permitted metal to be made available for civilian requirements.

Prices

The second major price reduction in less than two years was made when the Dow Chemical Company reduced its price on 99.8 percent magnesium ingot, carloads, from 22.5 cents to 20.5 cents a pound on January 1, 1943.

The Office of Price Administration ordered that, effective February 1, 1943, all ingot sales, except those to Metals Reserve Company, would be regulated by a ceiling price of 20.5 cents per pound.

Postwar Outlook

A large increase in the use of magnesium over that of prewar years is anticipated. On account of the lightness and strength of magnesium alloys their use in airplane manufacture will continue. The field of land transportation also gives promise of developing into a fertile market as the use of light metals improves efficiency and increases payload.

The field of portable equipment is also expected to provide markets for such application as foundry flasks and core boxes, pneumatic tools, typewriters and portable sewing machines.

The electrical and chemical industries, pre-war consumers of a part of the production, give promise of increased applications.

While the long-term outlook is bright, several years will pass before civilian consumption equals the large wartime demands of the past two years. There will undoubtedly be enough refined metal and alloys in Government possession to supply all requirements for several years and the ability of Permanente, California's only producer, to continue its operation may depend on the rate of release of Government stocks.

Permanente Metals Corporation also operates a magnesium sand-casting foundry and a seawater magnesia plant and future markets for their products may be another determining factor in the continued operation of the magnesium plant.

Employment

There are about 300 persons employed at Permanente (November 1944) which includes employees of the sand-casting foundry but not those engaged in the production of magnesia. It is doubtful that employment will exceed that figure and it may drop to almost zero if the plant cannot operate under postwar conditions.

Reference

Minerals Yearbook. 1942. U. S. Bur. of Mines.

MANGANESE

The pattern of manganese mining in California closely parallels that of chromite. Both are relatively inactive except when war disrupts the normal flow of these minerals from foreign countries. Under stimulation of higher prices and wartime demand, output rises to abnormal dimensions, and in post-war periods may be expected to recede to but a few hundred tons a year, and at times there is no production.

Production in the state began in 1867 at the Ladd Mine in the Tesla District of San Joaquin County and 5000 tons are reported to have been shipped to England during the next few years. Statistics of production were kept first in 1887. The tables show clearly the inability of California mines to meet competition from foreign deposits.

Manganese occurrences are widespread in the state, being reported in 44 counties. Production in recent years has come chiefly from Alameda, Amador, Imperial, Humboldt, Lake, Marin, Mariposa, Mendocino, Nevada, Mono, Plumas, Riverside, San Bernardino, San Joaquin, San Luis Obispo, Santa Clara, Sonoma, Stanislaus, Trinity and Tulare counties.

Uses

The chief use is in the manufacture of steel which consumes over 90 percent of all manganese used in the United States. Lesser amounts are used in dry-cell batteries, in the manufacture of manganese chemicals, and in the glass, ceramic and paint industries.

Manganese metal has been produced from domestic ores in unprecedented quantities during the war, a part of this being used to replace nickel in the coining of five-cent pieces. High purity manganese metal has been used in alloy steel to some extent and it is also used for alloying with magnesium and aluminum as well as with nickel, copper and zinc.

Markets

The peacetime requirement, in terms of metallic manganese content of ores, in the United States, is around 350,000 long tons. Sales are made direct to ferro-alloy, battery and chemical manufacturers, although some domestic ore and large amounts of imported material are handled by dealers. Normally California ore is sold to steel and other consumers for use within the state, with some shipments going to the steel plant at Geneva, Utah.

Prices

Prices paid for California ores during the past 10 years have ranged from $7.50 per ton upward according to grade with an average prior to war demand of $18.89 per ton.

Manganese prices were fixed by Metals Reserve Company on a revised basis on Sept. 1, 1944, for shipment after December 31, 1944.

These schedules for domestic ores require a minimum of 42 percent manganese whereas a 35 percent minimum was formerly accepted. Limitations as to copper, lead and zinc were reduced from an allowable 3 percent of combined metals to 1 percent. The base price of $1.00 per unit of 1 percent contained manganese in 48 percent ore was continued, with premiums and penalties for variations in analyses of manganese and impurities.

Many operators unable to meet this specification have been closed down.

Imports are subject to a duty of one-half cent per lb. of contained manganese.

Character and Extent of Reserves

Although manganese deposits, like those of chromite, are found in many parts of the state, there are no known deposits of size comparable to the deposits in foreign countries. The grade of ore ranges from 15 percent to as much as 50 percent Mn., but the bulk of reserves are low grade, without promise of contributing any important percentage of even peacetime needs of the United States.

Production

The war-time character of manganese mining in California is indicated by the production figures during World War I and the present.

War-time Production of Manganese in California

Year	Tons	Year	Tons
1914	150	1939	6
1915	4,013	1940	314
1916	13,404	1941	3,565
1917	15,515	1942	17,362
1918	26,075	1943	25,729
1919	11,569		
1920	2,892		

Total production in the state since records were first kept in 1887 to 1943 inclusive: 135,859 tons $3,839,845.

To this should probably be added 5000 tons shipped prior to 1887.

Manganese Ore Production in California, by Years

Year	Tons	Value	Year	Tons	Value
1887	1,000	$9,006	1914	150	$1,500
1888	1,500	13,500	1915	4,013	49,098
1889	53	901	1916	13,404	274,601
1890	386	3,176	1917	15,515	396,659
1891	705	3,830	1918	26,075	979,235
1892	300	3,000	1919	11,569	451,422
1893	270	4,050	1920	2,892	62,323
1894	523	5,512	1921	1,005	12,210
1895	880	8,200	1922	540	7,650
1896	518	3,415	1923	690	10,620
1897	504	4,080	1924	1,115	25,785
1898	440	2,102	1925	832	19,450
1899	295	3,165	1926	235	4,700
1900	131	1,310	1927	----	----
1901	425	4,405	1928, 1929	733	8,216
1902	870	7,140			
1903	1	25	1930, 1931	207	2,576
1904	60	900			
1905	----	----	1932	----	----
1906	1	30	1934, 1935	432	4,630
1907	1	25			
1908	321	5,785	1936	----	----
1909	3	75	1939	6	45
1910	265	4,235	1940	314	3,206
1911	2	40	1941	3,565	75,057
1912	22	400	1942	17,362	505,190
1913	----	----	1943	25,729	957,317
			Totals	135,859	$3,839,845

Postwar Outlook

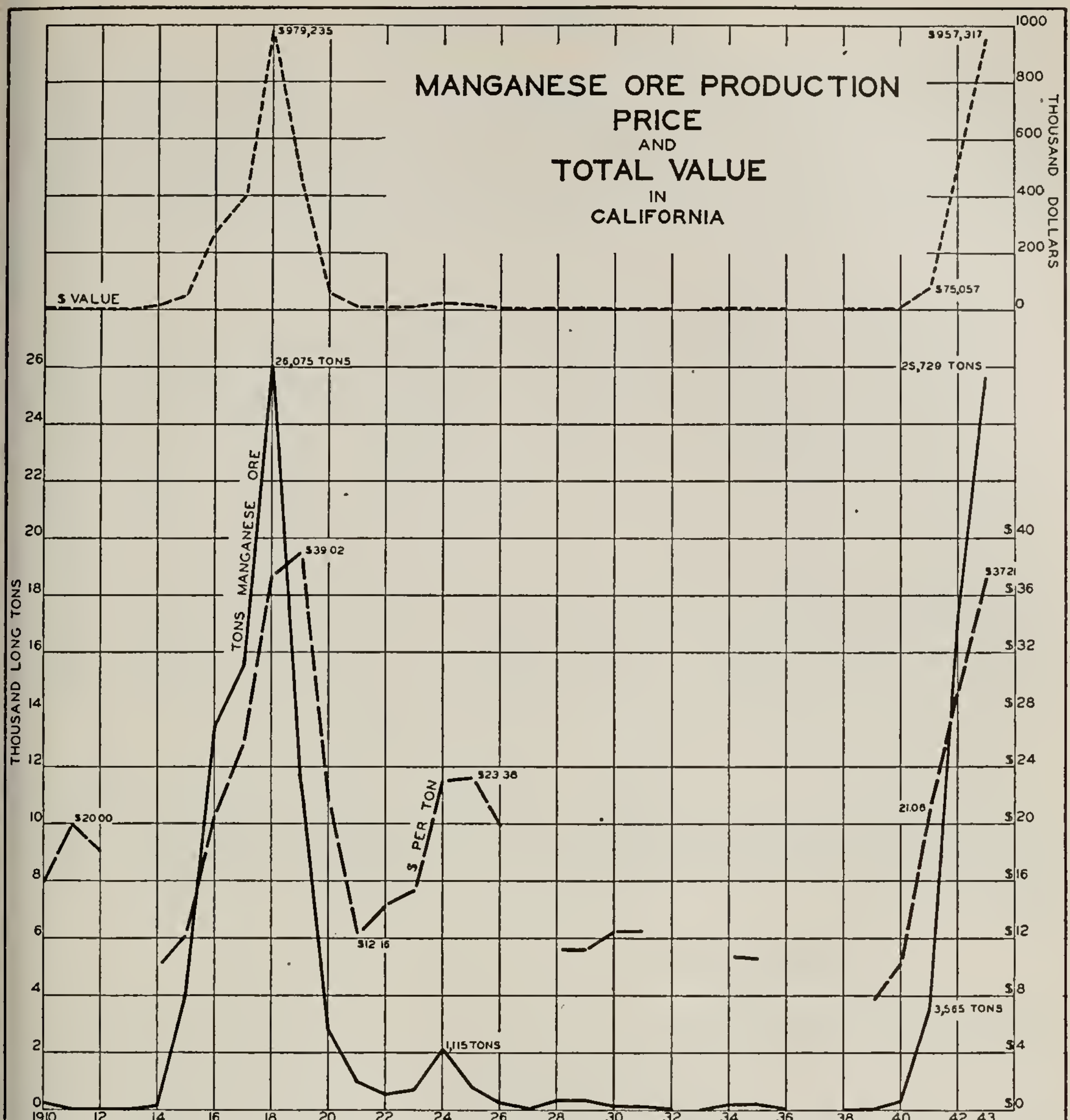
The postwar period with adequate supplies from abroad and withdrawal of government purchases is expected to again reduce production to relatively small output for local consumption.

The possibility of a continuation of ferro-alloy manufactures at Portland, Oregon, the requirements of the Fontana plant of Kaiser Company, and the other steel manufacturers may provide some increase over prewar demands for local ores.

The U. S. Bureau of Mines in a pilot plant to be built near Redding, Shasta County, will experiment with the manufacture of alloys from electrolytic manganese produced at Boulder City, Nevada, and this may also provide an outlet for additional California ores.

At Boulder City pilot plant tests are being conducted to extract metallic manganese from ores of the Ladd Mine. According to a report[a] by the U. S. Bureau of Mines, reserves are 232,000 tons of 18 percent ore at this property. The report gives estimates of plant and operating costs. A plan to erect a plant for this purpose at Oakland or Tracy is being studied.

[a] Electrolytic Manganese Plant—Oakland, Calif. War Minerals Report 59. U. S. Bur. of Mines. 1943.



Accompanying "Economic Mineral Resources and Production in California," California Division of Mines Bulletin 130

About 200 men were employed in mining the ores in 1943. Post war employment is uncertain and at best is unlikely to be more than a small part of this number.

References:

Manganese in California. Bull. 125. Cal. Div. of Mines. 1943.

Manganese. Mineral Abstracts. Cal. Div. of Mines. Unpublished.

Manganese and Chromium in California. Bull. 76. Cal. Div. of Mines. 1918.

MINERAL WATER

Mineral water is usually defined as "water coming from a spring and containing some characteristic mineral ingredients, as carbon dioxide or a lithium salt." In statistics of production in California this has been broadened to include water from artesian wells, bottled and sold for drinking, in part with artificial carbonation much of which is used in the preparation of soft drinks with flavors.

Mineral water is not included as a mineral resource by the U. S. Bureau of Mines in its recent statistical reports.

Production in California was recorded first in 1856 from Napa County and Sonoma County became a producer about the same time.

Sixteen counties, in 1943, had a combined output of 22,022,314 gallons, worth $814,700 at the spring. It is notable that Los Angeles County was the source of over 90 percent of the output. Other counties reporting were Butte, Colusa, Contra Costa, Lake, Marin, Napa, Orange, Placer, Riverside, San Bernardino, San Diego, San Luis Obispo, Shasta, Sonoma and Siskiyou. Employment at the springs is reported as about 100 men in 1943. These figures, however, do not give a clear picture of the industry which employs a large number of men in bottling and distribution. The retail value of this water is many times the reported amount, possibly in the range of $4,000,000.

At present there is an acute shortage of labor particularly in the bottling branch of the business and employment should expand substantially when labor is available. No separate census of this industry is available upon which to base estimates of present or future requirements.

Mineral Water Production of California, by Years

Year	Gallons	Value	Year	Gallons	Value
1887	618,162	$144,368	1917	1,942,202	$340,566
1888	1,112,202	252,990	1918	1,808,791	375,650
1889	808,625	252,241	1919	2,233,842	340,117
1890	258,722	89,786	1920	2,391,791	421,643
1891	334,553	139,959	1921	3,446,278	367,476
1892	331,875	162,019	1922	4,276,346	486,424
1893	383,179	90,667	1923	5,487,276	616,919
1894	402,275	184,481	1924	8,159,211	818,726
1895	701,397	291,500	1925	12,115,072	1,230,455
1896	808,843	337,434	1926	14,074,877	1,171,550
1897	1,508,192	345,863	1927	16,644,423	1,487,183
1898	1,429,809	213,817	1928	25,049,002	1,304,969
1899	1,338,537	406,691	1929	27,032,083	2,040,615
1900	2,456,115	268,607	1930	37,354,111	2,870,663
1901	1,555,328	559,057	1931	26,164,331	1,347,860
1902	1,701,142	612,477	1932	19,031,224	1,495,988
1903	2,056,340	558,201	1933	15,650,406	719,746
1904	2,430,320	496,946	1934	19,882,436	1,071,197
1905	2,194,150	538,700	1935	16,659,254	940,333
1906	1,585,690	478,186	1936	19,348,513	777,899
1907	2,924,269	544,016	1937	18,309,729	1,130,810
1908	2,789,715	560,507	1938	26,900,959	853,998
1909	2,449,834	465,488	1939	16,678,741	735,988
1910	2,335,259	522,009	1940	16,190,549	960,701
1911	2,637,669	590,654	1941	17,746,256	988,520
1912	2,497,794	529,384	1942	17,559,686	567,897
1913	2,350,792	599,748	1943	22,022,314	814,700
1914	2,443,572	476,169			
1915	2,274,267	467,738	Totals	563,151,965	$37,958,407
1916	2,273,817	410,112			

MINOR MINERALS

Arsenic

Arsenic is found in a number of localities in California in the mineral arsenopyrite which is frequently gold bearing.

Except for a small output in 1924 from the Chipman Chemical Company plant at Bay Point in Contra Costa County, there has been no commercial recovery of arsenic from California ores.

Bismuth

Several bismuth minerals have been found in widely separated counties of the State but the only commercial production recorded was 20 tons valued at $2,400 in 1904, and credited to Riverside County.

During 1942 several hundred pounds of bismuth concentrates were made at a tungsten mine in Fresno County but no shipments were made.

Cadmium

Cadmium in California occurs in association with zinc ores. The only production recorded in the State was during 1917 and 1918 when several thousand pounds of cadmium metal was recovered by the electrolytic zinc plant of the Mammoth Copper Company in Shasta County.

Fluorspar

Deposits of fluorspar have been reported in Los Angeles, Mono, Riverside and San Bernardino counties. Production has been small: 79 tons in 1917-1918 from Riverside County and 227 tons worth $3,631 from San Bernardino County in 1933-1934.

Graphite

The production in the State has been small, due to the impure and low-grade deposits which can not compete with the high-grade imported variety. Total value 1901 to 1943 was $86,975.

Production since 1901 has been spasmodic and there has been none in the past ten years. Sonoma County furnished the main production, which was used for the manufacture of paint. There has been a small output from Los Angeles County, used for paint and foundry facing.

Grinding-mill Pebbles

During the World War I years 1916 to 1918, when imports from European sources stopped, production of grinding-mill pebbles amounted to 50,000 tons, worth $260,000. This originated in San Diego and Fresno counties. Some also has come from Sacramento and Calaveras.

Since that period, output has been sporadic and in the past ten years has averaged less than $2,000 per year.

Mica

The total production since 1902 was only 14,618 tons, worth $97,000 and most was produced in Imperial, Inyo and Mariposa counties. There was no output in 1942 or 1943.

The mineral mined was sericite, a cheap grade used for roofing, foundry facing and a decorative material to imitate snow. Some muscovite is also produced at times.

Mineral Paint

Deposits of mineral paint have been reported in 24 counties and since 1890 small shipments have been made from 14.

Value of production averaged about $5,000 per year until 1937, since which time it has dropped to nominal amounts and it is reported that artificial mineral paint is replacing the natural product.

Tin

Apart from one deposit of tin ore in Riverside County which produced 126 tons, worth $60,000 in 1891 and 1892, there has been no commercial production of any importance in the State. Deposits in San Bernardino County have been developed during the past two years.

Titanium

During 1927 and 1928 there was a production of 10,000 tons of titanium-bearing material valued at $150,000. All came from Los Angeles County and was produced either from the beach black sands or from illmenite deposits in the San Gabriel Mountains.

There was no further output until 1939. In that year and each year since, there has been a small production from the beach sand at Hermosa Beach.

MOLYBDENUM

Occurrences of the ore have been discovered in Alpine, Calaveras, Inyo, Plumas, San Bernardino, San Diego, Shasta, Siskiyou, Trinity, Tulare and Ventura counties.

Notwithstanding this wide distribution, production first recorded in 1916 was unimportant until 1939. The sole producer in California in recent years is the U. S. Vanadium Corporation from its Pine Creek tungsten mines, molybdenum being recovered as a by-product. It is present in the tungsten ores, averaging about 0.5 percent MoO_3 (equivalent to about 0.45 percent MoS_2).

Uses

The chief use of molybdenum is as an alloy metal in the steel industry. The oxide and ammonium molybdate have however a limited field in the chemical and ceramic trades.

Markets. Prices

While prices in trade journals persistently quote 45 cents per lb. of contained MoS_2 for concentrates averaging 90 percent MoS_2, the standard minimum in the trade is 80 percent and sales are at 37 cents to 39 cents per lb. MoS_2 delivered at eastern points, depending on the copper content. Purchases for British account in 1944 were at the rate of 65.5 cents per lb. of contained Mo, packed for export. About 50 percent of United States production is normally exported, domestic consumption being far below that of Europe.

Tariff Rates

Molybdenum ore or concentrates, 35 cents per pound on the metallic molybdenum contained therein.

Production

Molybdenum Production in California, by Years

Year	*Pounds of MoS_2*	*Value*
1916	9,280	$9,945
1917	7,290	9,014
1918	------	------
1919	270	300
1933 / 1934	1,306	306
1935	------	------
1936	------	------
1937	------	------
1938	------	------
1939	75,180	29,964
1940	249,265	117,162
1941	256,979	86,889
1942	1,395,776	504,115
1943	1,587,533	637,199
Totals	3,582,879	$1,394,894

There was no California production in the years 1935-1938 inclusive. Production by U. S. Vanadium Corporation at Pine Creek, Inyo County, commenced in 1939 and output during 1939 to 1943 inclusive amounted to 3,564,733 lbs. MoS_2.

The Climax Mine in Colorado is the world's largest producer. Substantial amounts also come from the Bingham Canyon copper deposits of Utah Copper Co. in Utah, Miami Copper Co., the Bagdad, the Mammoth-St. Anthony Mines in Arizona, and Molybdenum Corporation in New Mexico.

Postwar Outlook

Inasmuch as U. S. Vanadium company plans to operate at full schedule in the immediate postwar years, production will presumably continue at current rates. As the operation is essentially for tungsten production, employment estimates are considered under that subject.

While there are a large number of known occurrences in the State, with some reported to be of considerable size, their operation would be faced with already adequate supplies from existing low-cost producers, particularly from mines in Colorado:

References:

Minerals Yearbook 1942. U. S. Bur. of Mines. 1943.

Molybdenite. Mineral Abstracts. Calif. Div. of Mines. Unpublished.

PLATINUM

In California, the platinum group metals which include platinum, palladium, osmium, iridium, rhodium and ruthenium, are obtained as by-products from gold-placer operations. The major portion comes in normal times from dredges operating in Amador, Butte, Merced, Sacramento, Stanislaus, Shasta, Trinity and Yuba counties. Inasmuch as most of these operations were closed down because of government restrictions on gold dredging, there is little, if any, current production.

Production, since records were first kept in 1887, has totaled 22,520 ounces of a value of $1,096,665. Average annual production for 10 years prior to 1943 amounted to 654.3 ounces.

As employment is incidental to placer gold operations no separate figures of employment are given.

Tariff Rates

Platinum, unmanufactured or in ingots, bars, sheets, or plates not less than one-eighth of one inch in thickness, sponge or scrap, is imported duty free.

POTASH

Potash was first produced in California in 1914 when 10 tons were obtained from kelp. The expiration of potash contracts for deliveries in the United States by the German cartels in 1912 and the closing off of supplies following the declaration of war in 1914, brought about a nation-wide search for domestic sources. This resulted in the successful extraction of potash from the brines in Searles Lake, San Bernardino County. While potash is found in other alkali lakes these have not been worked either because the potash content is too low or the size is inadequate to sustain a commercial operation.

American Potash & Chemical Corporation is the only producer in the State at present. West End Chemical Company produces borax and soda from the same brines but makes no attempt to recover potash.

With the development of solid potash salts deposits in New Mexico, the United States is fully independent of foreign sources, with a potential output of 854,000 tons K_2O per year. In peacetime the United States exports a substantial amount. Imports in 1940, however, were somewhat larger than exports.

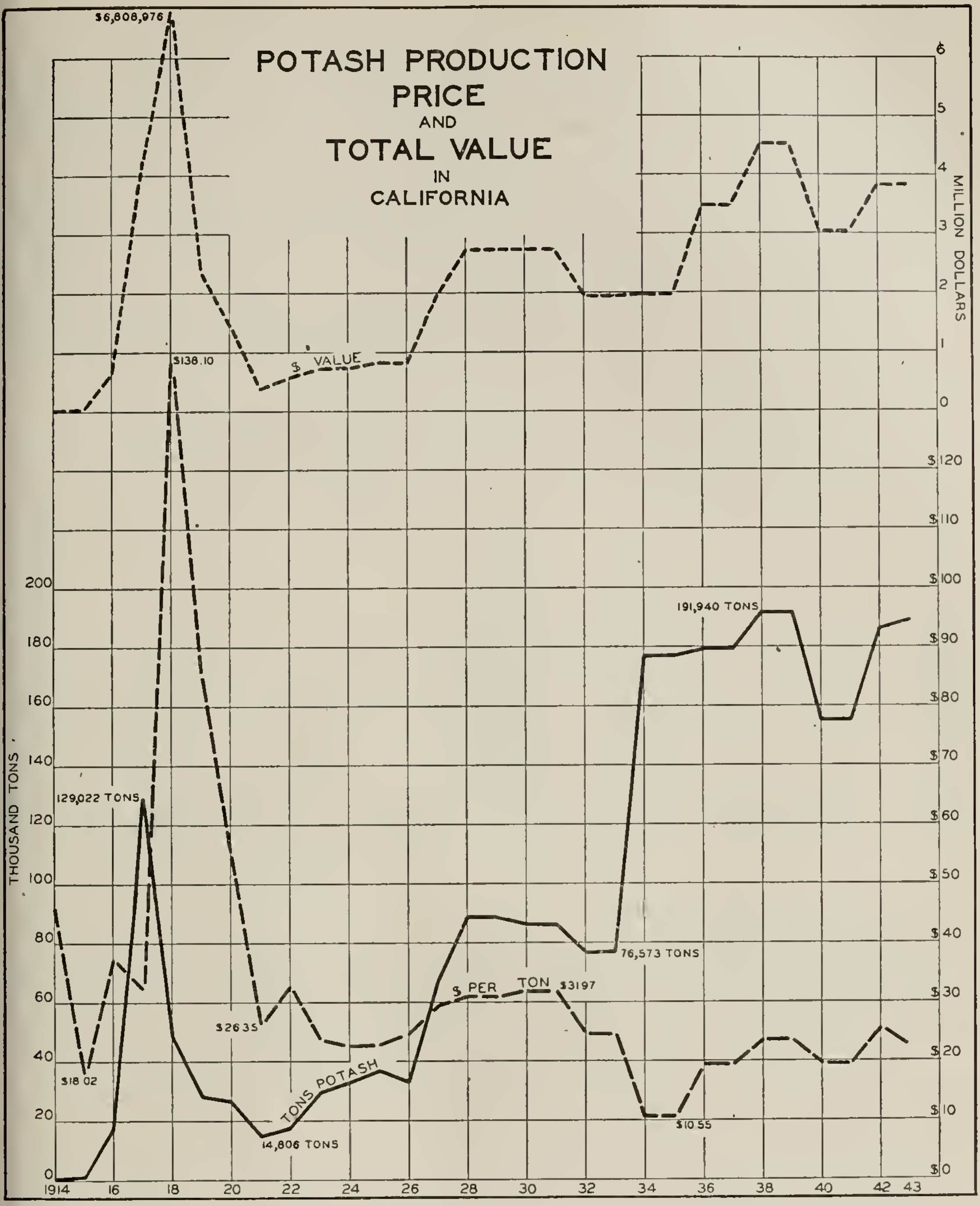
Uses

Over 90 percent of potash consumed in the United States is for agricultural use, the remainder being used in the chemical and industrial fields.

Markets. Prices

Consumption of potash in the United States in 1940 [1] obtained by subtracting exports (83,800 tons) from the sum of domestic sales (366,287 tons) and imports (99,569 tons) was 382,059 tons of K_2O.

[1] Minerals Yearbook. U. S. Bur. of Mines. 1940.



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Prices which are usually quoted subject to seasonal discount are as follows:

Muriate, 50-60% K_2O: ex-vessel, ports 53½¢ per unit of 1% K_2O, with seasonal contract discount of 12 percent until March 31, 1945.

Manure salts are quoted at 20 cents per unit, f.o.b. Carlsbad, New Mexico, for material containing not less than 22% K_2O.

Tariff Rates

Potassium chloride or muriate of potash, potassium sulphate, kainite, wood ashes and beet-root ashes, and all crude potash salts not specially provided for, are imported duty free.

Character and Extent of Reserves

Early estimates [1] placed a figure of 4,000,000 tons of saleable potash salts as the minimum available content of Searles Lake. Since that time production has been in excess of 2,500,000 tons calculated as 60 percent salts. If this early estimate were correct it would imply exhaustion in less than 15 years.

Reserves, however, are now believed to be much greater and may last 50 years or more at the rate of extraction (over 150,000 tons a year), prevailing during the past 10 years.

As in the case of other mineral products, the classification of material as a reserve, presumes a future price, cost of production and extraction at levels which will permit profitable operation.

Total Production of Potash Salts in California, by Years

Year	Tons	Value	Year	Tons	Value
1914	10	$460	1930, 1931	172,263	$5,500,536
1915	1,076	19,391			
1916	17,808	663,605	1932, 1933	153,147	3,932,721
1917	129,022	4,202,889			
1918	49,381	6,808,976	1934, 1935	355,604	3,750,809
1919	28,118	2,415,963			
1920	26,298	1,465,463	1936, 1937	358,417	6,988,922
1921	14,806	390,210			
1922	17,776	584,388	1938, 1939	383,981	9,057,866
1923	29,597	709,836			
1924	33,107	747,407	1940, 1941	310,023	6,058,274
1925	36,355	829,770			
1926	32,884	812,285	1942, 1943	375,542	7,657,335
1927	67,434	1,952,852			
1928, 1929	178,680	5,522,350	Totals	2,671,335	$69,077,308

Postwar Outlook. Employment

American Potash and Chemical Company is the sole employer in potash extraction in California. The company, although suffering a shortage of labor, employed about 1,350 men in 1944.

No reduction of tonnage in the postwar period is anticipated and the number of men employed will probably remain unchanged.

References:

The American Potash & Chemical Corporation. Bull. Issued by the company. 1940.

Mumford, R. W. Potassium Chloride from the Brine of Searles Lake. Ind. Eng. Chem. Vol. 30. Aug. 1939.

Turrentine, J. W. "Potash" Amer. Chem. Soc. Mono. Ser. 1943. Chem. Cat. Co. Inc.

[1] Hoyt, S. Gale. Bull. 580. U. S. Geol. Surv. 1912.

PUMICE AND PUMICEOUS MATERIALS

The term pumice has been employed loosely to include a variety of cellular glassy rocks, products of volcanic activity and composed preponderantly of silica and alumina.

The pumice of Italy is a fairly strong cohesive material with vessicles which are fairly uniform and fine enough to give it a frothy appearance. Little of the California pumice is of similar character and the term is used locally to include pumicite, scorea and other cellular, and sometimes amygdaloidal lavas of light density due to structure. Volcanic ash is also sometimes designated locally as pumice.

Materials of this class are found in many localities in the State. Pumice has come largely from Siskiyou and Imperial counties and a coarse granular variety from Mono county. Extensive deposits of fine white pumice occur near Friant, Fresno county, and a bed of volcanic ash is mined by Cudahy Packing Company in Kern county. Similar material has been produced in Inyo, San Luis Obispo, Napa, Madera and Modoc counties.

Uses

Probably about 90 percent of pumice and pumicite produced in California is used for abrasive purposes in the form of powders and soap. It has been used in manufacture of sound-proof plasters and as a light-weight aggregate in concrete.

It has been proposed that ground pumice be incorporated in concrete not simply as an aggregate, but as a source of reactive silica to combine with free lime in the cement, thus reducing shrinkage and effecting an economy in the amount of cement required.

This has been tested on a substantial scale and has been reported to produce exceptionally favorable results. One investigator, A. M. M. Russell of the State Harbor Commission, who has made extensive tests disputes this conclusion, but suggests that pumice ground to 200 mesh may be used advantageously to the maximum extent of 2 percent solely for the purpose of providing controlled fines.

The use of pumice as a light-weight aggregate has not been generally successful because of the low compressive strength of the product.

Pumiceous material used in road construction and in the manufacture of building blocks at times accounts for over one-half the State's production.

Markets

Most of the material mined in California other than road metal is used in the manufacture of abrasive preparations, either as powder or in soaps, and is distributed on the Pacific Coast and in mid-western states. Sales for the past 10 years have shown substantial growth increasing from about 10,000 tons in 1934 to 85,000 tons in 1941. In 1942 shipments fell to 55,000 tons and in 1943 to 21,000 tons due to war conditions.

But little of the higher grade lump pumice normally imported from Italy, is produced in California. The entire consumption in the United States of this quality of material probably does not exceed 200 tons per year.

Prices

There are no open quotations for pumicite, volcanic ash and pumiceous materials as most of the output comes from consumers' operations. The average value for California material for 1943 was reported by producers as $6.74 per ton. Pumice stone is quoted in E. & M. J. Metal and Mineral Markets (October, 1944) at $2\frac{1}{2}$@$4\frac{1}{2}$¢ powdered in barrels and 5@$7\frac{1}{2}$¢ for lump.

Tariff Rates

Pumice stone, unmanufactured, valued at $15 or less per ton, has an import duty of $\frac{1}{10}$ of 1 cent per lb.; valued at more than $15 per ton, $\frac{1}{4}$ of 1 cent per lb.; wholly or partly manufactured, $\frac{3}{4}$ of 1 cent per pound.

Character and Extent of Reserves

The reserves of pumice and the pumiceous rocks including volcanic ash have never been accurately estimated but are extensive enough to last indefinitely at the present rate of production.

Production

The growth of the industry is notable since production started with 50 tons in 1909. In 1942 output was reported from 12 operations, three each in Inyo and Siskiyou counties; two each in Kern, Madera and Mono counties, and one each in Modoc, Napa and San Luis Obispo counties.

In 1943 only 8 operations reported production and the total of 21,154 tons was less than 25 percent of the high point reached in 1941.

A major factor in that year's output was Basalt Rock Company's quarry near Monticello, Napa County, and much of this production was used in road construction and some in the manufacture of building blocks.

Pumice Production of California, by Years

Year	Tons	Value	Year	Tons	Value
1909	50	$500	1927	13,779	$168,896
1910			1928	10,440	105,055
1911			1929	10,449	76,123
1912	100	2,500	1930	12,947	128,847
1913	3,590	4,500	1931	11,711	108,130
1914	50	1,000	1932	9,891	86,034
1915	380	6,400	1933	8,243	61,067
1916	1,246	18,092	1934	9,951	54,748
1917	525	5,295	1935	14,890	87,055
1918	2,114	28,669	1936	17,132	143,709
1919	2,388	43,657	1937	10,392	79,005
1920	1,537	25,890	1938	18,783	105,207
1921	406	6,310	1939	41,109	159,951
1922	613	4,248	1940	35,162	126,516
1923	2,936	16,309	1941	85,309	283,663
1924	4,919	33,404	1942	55,603	209,539
1925	5,319	32,937	1943	21,154	142,665
1926	7,170	48,350			
			Totals	410,288	$2,404,271

Postwar Outlook

The industry may reasonably double its 1943 output when labor and transportation are available after the war. At its peak of activity in 1941 the entire industry employed 73 men with an average output of

1,100 tons per man for the year. This rate had risen to 1,300 tons in 1943 when but 41 men were employed.

Seventy-five men may be required for postwar operations and this number is expected to increase with normal growth of demand.

References:

Pumice and Volcanic Ash: Mineral Abstracts. Calif. Div. of Mines. 1939.

Industrial Minerals and Rocks. A. I. M. E. 1937.

PYRITES

This material includes several minerals of the iron sulfide group, chiefly pyrite and pyrrhotite.

It has been mined as a separate ore in Shasta and Alameda counties in substantial quantities. It is frequently found associated with metallic ores and coal, and much of the pyrite mined contains some copper, gold and silver.

It was formerly mined in large quantities in Alameda County within a few miles of the center of Oakland; the output being converted to sulfuric acid in plants in the Bay district. In recent years most and often all of the production has come from the Mountain Copper Company in Shasta County.

Uses

The chief use of pyrites is in the manufacture of sulfuric acid. This does not, however, include pyrites ore and concentrates treated to recover gold and other metal present.

Markets

All output from California mines is used in the manufacture of sulfuric acid, except as above noted pyritic ores treated to recover metallic value other than iron.

When ore is roasted to drive off the sulfur content as gaseous oxide, as in the manufacture of acid, there remains a cinder of iron oxide of a deep reddish color. Pyritic cinder is used in some eastern steel plants for its iron content to a limited extent and some of the material has been used in the manufacture of paint as well as a source of iron in the production of portland cement.

There are large accumulations of this material averaging about 58 percent iron in California as elsewhere, and research may ultimately determine other uses for it. It is being accumulated at the rate of around 40,000 tons a year in California, and stockpiles in the San Francisco Bay region are estimated to be around 1,000,000 tons.

Price

The average value of production over the past 10 years has been \$3.80 per long ton at shipping point, although current prices are somewhat higher. The average value in prewar years (1934-1939) was about \$3.75 per ton. Spanish pyrites is quoted (September 1944) c.i.f. New York at \$8 to \$10 per long ton.

Tariff Rates

Pyrites or sulphide of iron in its natural state is imported duty free.

Character and Extent of Reserves

Reports of the State Mineralogist record deposits described as extensive in Mendocino, Shasta, Siskiyou and Santa Clara counties. Formerly operations in Alameda County yielded substantial amounts for acid manufacture but these have not been operated for many years.

The Mountain Copper Co. in Shasta County, has been the only producer for several years. The ore is massive, being crushed and shipped without concentration, and is reported to average about 50 percent sulfur.

Should demand and price justify it is believed that production from various deposits could be substantially increased. Other sulfide ores, containing copper or other metals, are also a potential source of sulfur for acid manufacture.

PRODUCTION

Year	Short tons	Value	Value per per ton
1934 1935	157,129	$547,754	$3 49
1936 1937	155,107	541,915	3 49
1938 1939	127,604	452,901	3 54
1940 1941	167,711	598,870	3 57
1942 1943	221,752	942,300	4 24

Postwar Outlook

The higher rate of production and value reflects in part the demand due to war conditions. Postwar outlook is uncertain insofar as maintenance of the current high rate of output is concerned. One of the important uses of sulfuric acid, the sale outlet for California pyrites, is in the manufacture of fertilizer. It seems probable that demand for fertilizer materials in the Orient may be far higher than ever before, and this may make it possible to maintain operations on a level higher than the prewar period. In that field, however, it would have to meet competition from Japan, Australia and New Zealand.

Postwar Employment

Ninety men were employed in the mining and shipping of pyrites in 1943 as against 40 men in 1935. Employment may continue in this range.

References:

Pyrites. Mineral Abstracts. Calif. Div. Mines. Unpublished.

Minerals of California. *Bull.* 113, Calif. Div. Mines, 1938.

QUICKSILVER

Mercury, commonly called quicksilver in California, is of widespread occurrence in the State. Production in 1943 came from 86 properties situated in Colusa, Contra Costa, Del Norte, Inyo, Lake, Napa, San Benito, San Luis Obispo, Santa Barbara, Santa Clara, Siskiyou, Sonoma, Trinity and Yolo counties. Of these 49 produced to the extent of 10 flasks or more.

Uses

The chief use of mercury is in the manufacture of chemicals and pharmaceuticals. Mercurous chloride, a drug known as calomel, is one of the most important mercury salts used. Military demand for mercury compounds for antiseptics and prophylactics and for chemical warfare has resulted in an extraordinary demand. Except for its use in chemical warfare this increase has not been due generally to any special wartime uses.

''An important use of mercury[a] is in the manufacture of fulminate, a high-explosive compound used in percussion caps and detonators. The increase in the amount of mercury so consumed, however, has not been so large as might have been expected in time of war, because hexanitrommanitol, lead azide, and lead styphnate, which have proved to be safer and more reliable than mercury, are now preferred to mercury fulminate. Mercury fulminate is said to be unstable and subject to some deterioration when stored in hot climates. The war use of mercury in munitions other than as the fulminate, however, has greatly increased, proportionately as well as in actual amounts. Most of the mercury in this category goes into tracer bullets, and some into pyrotechnics.

''Substantial amounts of mercury are used in the electrical industry and in industrial and control instruments. Among the more important electrical products are mercury-vapor lamps, quartz mercury-vapor arc lamps used for the production of ultraviolet rays for medical and scientific purposes, and fluorescent lamps. Some of the other electrical uses are in rectifiers, oscillators, batteries, rectifier bulbs, and switches. Among the industrial and control instruments in which mercury is essential are gas-pressure gages, tank gages, gas-analysis apparatus, flow meters, heat-control devices, thermometers, barometers, and compensating clock pendulums. An important industrial application is in mercury diffusion pumps that produce the high vacuum required in making radio and neon tubes.

''The use of mercury in the manufacture of vermilion and for carroting fur felt for hats has declined greatly. Available partial substitutes for vermilion are other and cheaper red pigments, including chrome red, antimony sulfuret, and vermilionette, a coal-tar derivative. The laws of most States prohibit the use of mercury in the manufacture of felt because of the danger of mercuric poisoning; instead of a mercuric-nitrate solution, the industry now employs potassium chlorate. In 1942 and 1943 the application of mercury in marine antifouling paint was restricted, and the metal was replaced in part by chromates and lead salts.

[a] Mercury. U. S. Tariff Commission Report No. 4—June 1944.

"Various other applications of mercury and mercury salts include their use in dental and other amalgams, in seed disinfectants, and as a catalyst in the manufacture of chlorine, caustic soda, and acetic acid. Small amounts of mercury are used for amalgamation of free-milling gold ore (formerly the largest use), for general laboratory use, and in wood preservatives. Sporadic but substantial purchases of the metal were made during the 1920's for mercury-vapor boilers in power-generating plants, but there have been no new installations in recent years."

Markets

Consumption of mercury in the United States for 10 years, 1929-1939, averaged about 27,000 flasks (76 lbs. each) annually. Domestic consumption rose rapidly from war demand to 54,500 flasks in 1943, of which California produced over 62 percent or 33,948 flasks. Normally about one-third of United States requirements are imported.

Sales are usually made through metal dealers, most of whom are situated in New York, although larger producers at times deal direct with consumers.

Prices

Quotations are usually on a delivered basis in New York and are several dollars a flask higher than prices received by the operator. There is a wide range in quotations from year to year as shown in the accompanying graph.

During the industrial activity of 1927-1930 inclusive, prices held above $110 per flask, dropping in 1932 to $52.30 per flask, the lowest previous figure since before World War I, being $44.56 in 1921.

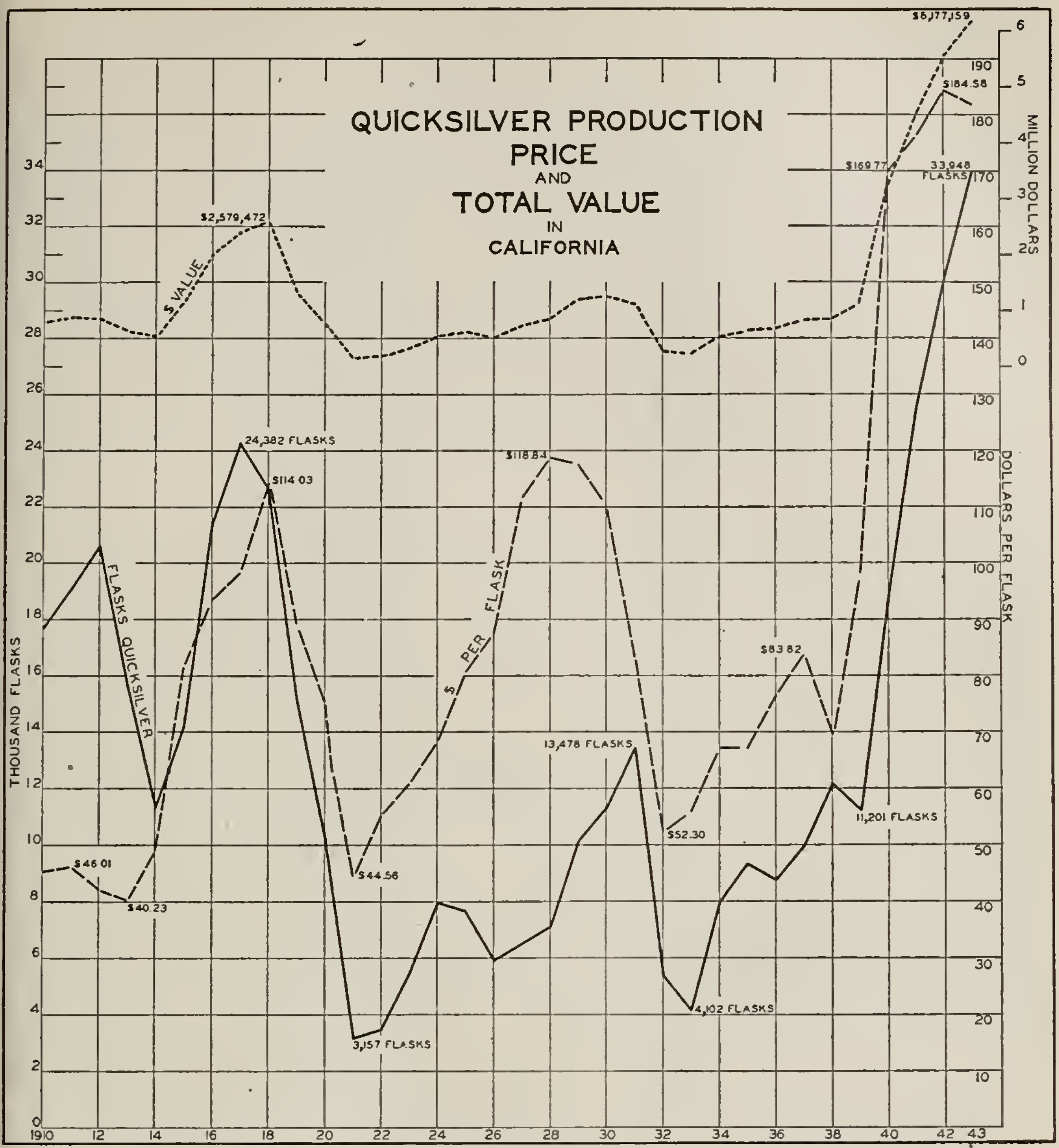
War demand raised the average California price to $184.58 in 1942. In 1943 the average dropped to about $181 although sales were made at over $200 per flask. In 1944 a precipitous drop took place as war requirements had more than been met by increased supplies. In September quotations ranged from $104 to $107 per flask f.o.b. New York.

This resulted in the closing of many operations in California and elsewhere. Concurrently with the consequent reduction in output there developed an extraordinary increase in demand for mercuric oxide for the manufacture of batteries. As a result, consumption in the United States in October was 3900 flasks with a production of only 2500 flasks. In December the shortage had necessitated the release of quicksilver by Metals Reserve Company from government stockpiles and prices rose to about $150 per flask, f.o.b. New York, at the year end.

Under the Fordney-McCumber Act, 1922, import duty on quicksilver was fixed at 25 cents per lb. or $19 per flask, and this rate has since held.

Character and Extent of Ore Reserves

Because of the irregular character of quicksilver deposits and to some extent the uncertainty of prices, developed ore reserves have never been substantial. Orebodies are mined as they are encountered and individual deposits of which a single mine may contain many, may be small or substantial. Potential resources are, however, probably large if prices are high enough to warrant operation. The average grade of ore treated has declined from time to time, partly because of the exhaustion



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of high-grade easily accessible ore deposits, but also due to more efficient operations with reduced costs, permitting the treatment of ore of lower grade than was possible in the earlier days of the industry.

Occurrences of quicksilver are widespread and undoubtedly have not all been discovered either on the surface or underground. An example of this is a recently found relatively high-grade orebody at the New Idria Mine, notwithstanding that it has been in operation since 1854. The grade and extent is such as to permit operation for three or four years even at somewhat reduced prices.

Domestic ores, including those of other States, had an average quicksilver content of 0.37 percent for the 10-year period before the war. This is in contrast to 6 to 8 percent for Spanish and about 0.75 to 1.0 percent for Italian ores. Under the most favorable circumstances of adequate tonnage and operating conditions, it is generally not possible to operate profitably on ore of a value of less than $5 per ton.

Production

Quicksilver Production of California, by Years

Year	*Flasks*	*Value*	*Average price per flask*
1910	17,665	$799,002	$45.23
1911	19,109	879,205	46.01
1912	20,600	866,024	42.04
1913	15,661	630,042	40.23
1914	11,373	557,846	49.05
1915	14,199	1,157,449	81.52
1916	21,427	2,003,425	93.50
1917	24,382	2,396,466	98.29
1918	22,621	2,579,472	114.03
1919	15,200	1,353,381	89.04
1920	10,278	775,527	75.45
1921	3,157	140,666	44.56
1922	3,466	191,851	55.35
1923	5,458	332,851	60.98
1924	7,948	543,080	68.33
1925	7,683	621,831	80.81
1926	5,892	516,382	87.64
1927	6,488	714,418	111.67
1928	(b)7,107	844,649	118.84
1929	10,152	1,195,705	117.78
1930	11,374	1,255,257	110.36
1931	13,478	1,121,624	83.22
1932	5,349	279,780	52.30
1933	4,102	229,472	55.94
1934	7,946	534,135	67.22
1935	9,353	628,590	67.23
1936	8,758	671,055	76.62
1937	9,995	837,789	83.82
1938	12,171	846,497	69.55
1939	11,201	1,105,563	98.43
1940	18,907	3,209,754	169.77
1941	25,612	4,509,041	176.03
1942	30,087	5,553,357	184.58
1943	33,948	6,177,159	181.96
Totals	452,147	$46,058,345	

(b) Flasks of 76 lbs. from January, 1928.

Total output of record commencing 1850, 2,524,865 flasks—$138,-661,446.

Postwar Outlook

The postwar position of California quicksilver production is characterized by uncertainty due to large stocks on hand in the United States and in foreign countries, principally in Italy, Spain and Germany. There is the further uncertainty as to the maintenance of the present tariff of 25 cents per lb. or $19 per flask.

Stocks under government control are believed to be from 100,000 to 115,000 flasks, sufficient to last two years at the present rate of consumption and over four years at the average rate prevailing for 10 years prior to 1939.

Stocks in Italy and now in Allied hands are reported to be about 10,000 flasks.

Spanish shipments during the war are believed to have been chiefly to Germany, and it seems probable that large stocks exist in one of those countries.

Only a minor part of California output is exported under peace-time conditions as it cannot compete with foreign production. Prices of foreign metal are generally about $20 per flask lower than New York prices.

Sales of foreign metal have been for some years controlled by a cartel operated by Spanish and Italian producers.

In Report No. 4, published June, 1944, entitled ''Mercury,'' by the United States Tariff Commission, it is recommended that American production be held to a minimum point necessary only to maintain facilities for expansion in any future emergency. The statement is as follows:

"Conservation of Mercury Resources

''The facts presented in this survey indicate that the National interests would be better served by a policy of conserving our very limited resources of mercury. Even at the pre-war rate of domestic production, the average grade of ores has steadily declined. This decline has led to the belief, held by some, that the mercury deposits in this country may soon be exhausted. The increased use of these limited reserves during the present war emergency has been unavoidable. In peacetime, however, a policy that would encourage their rapid exhaustion and thus weaken our position from the standpoint of the future National defense and also expose us still more to the possible exactions of a foreign mercury cartel, would appear unwise. In these circumstances, the extent to which operation of the mercury mines should continue after the war seems to depend on the extent to which operation is essential in order to provide reasonable operating facilities which could be readily expanded when needed for National security. Beyond this point, it would appear that measures tending to hasten the exhaustion of our limited resources should be avoided."

The report makes no suggestion as to what steps might be taken to reduce the industry to a mere maintenance basis, but it is clear that quicksilver production in California can not compete in the domestic market without an adequate protective tariff.

Postwar Employment

The extent to which the industry can operate in the future is directly related to price. Output by September, 1944, had already been sharply curtailed as the result of a precipitous drop, with employment reduced from high war-time levels of 1,285 in 1942, to about 450 men in September, 1944. (See Footnote, p. 191)

Prices following this war will probably drop further with continued contraction of output during which possibly not over 250 to 300 men could be employed.

The industry hopes for prices stabilized at around $105 to $115 which would provide employment for around 450 men.

The average number employed in recent years and the relation to price is shown in the following table:

Year	*Men employed*	*Average per flask Price in California*
1938	329	$69.55
1939	400	98.43
1940	850	169.77
1941	1,089	176.03
1942	1,285	184.58
1943	992	181.96
1944, Oct. 15th	450	98.00

References:

Bradley, Walter W., Quicksilver Resources of Calif.; *Bull.* 78, Calif. State Mining Bureau. 1918.

Ransome, Alfred L., Quicksilver Resources of Calif.; Quarterly *Report*, State Mineralogist. Vol. 35, Oct. 1939.

Mercury: Report No. 4, U. S. Tariff Commission, June, 1944.

SALT

By Walter W. Bradley [1]

Deposits of salt and salt-bearing brines and mineral springs are abundant in California, especially in the deserts of Imperial, Inyo, Kern and San Bernardino counties. Modoc County produces salt from the evaporation of alkaline lake water and a small amount of medicinal salts has been produced in Mono and Butte counties.

The largest tonnage is derived from solar evaporation of sea water and in 1943 plants were operating on the shores of San Francisco Bay in Alameda County, at Moss Landing on Monterey Bay, Monterey County, on San Diego Bay, San Diego County, and at Long Beach, Los Angeles County.

A large tonnage of rock salt was mined near Amboy in San Bernardino County in 1942-43, and one operator in the same county whose main product is sodium sulphate produced salt as a by-product.

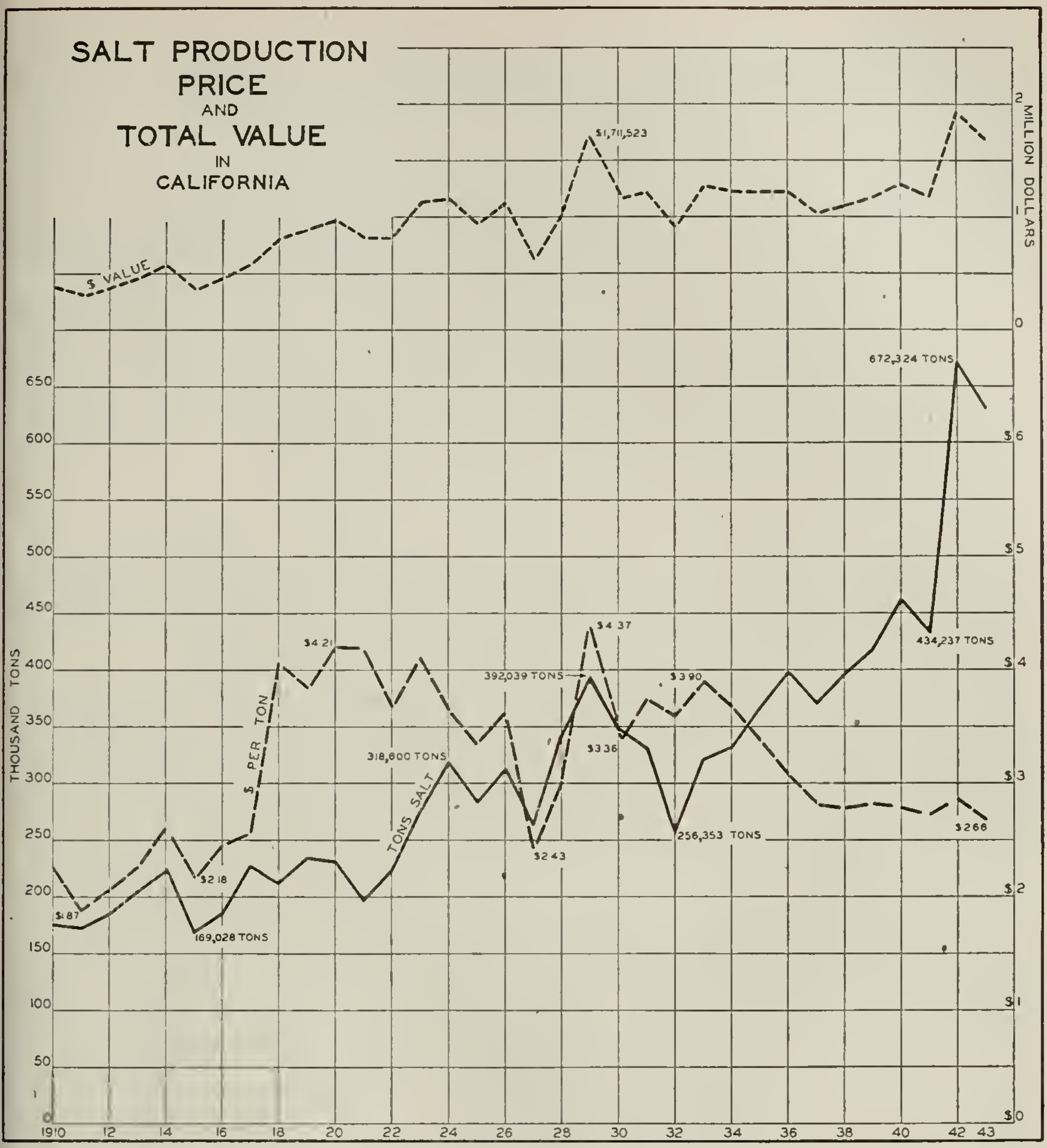
Uses

Salt has many uses in chemical and other industries, agriculture, metallurgy, medicine and in the home. In 1943 the principal uses in the United States were as follows, in percentage of total consumption:

Soda ash	47 percent
Chlorine	17 percent
Livestock	6 percent
Meat packing	6 percent
Table and other household uses	4 percent
Other chemicals	3 percent
Water treatment	2 percent
Others	15 percent
	100 percent

These are but a few of the fourteen hundred uses listed by one large producer.

[1] State Mineralogist, California State Division of Mines.



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Markets

Salt for industrial uses is sold direct to the consumer.
Salt for table and other household uses is sold through jobbers.

Prices

Prices quoted (Nov. 1944) by the largest producer were as follows for carload lots:

Salt—crude, undried, solar evaporated; bulk	$4.75 per ton
Salt—crude, kiln dried, 125 lb. bags	10.00 per ton
Salt—vacuum, 100 lb. bags	18.50 per ton

Producers, however, report the value of output at figures far below these prices, as will be seen in the accompanying graph. In 1943 the reported value was only $2.68.

Tariff Rates

Sodium chloride or salt: In bags, sacks, barrels, or other packages, has an import duty of 7c per 100 lbs., in bulk, 4c per 100 lbs.

Reserves

Reserves, so far as sea-water evaporation plants are concerned are unlimited and production is governed only by market demands and the capacity of the plants that can be built to supply those demands.

The rock salt deposits of the desert dry lakes have been estimated to contain reserves of at least 80 million tons.

Furthermore, there are immense potential reserves in the brines of Searles Lake from which salt may be recovered as a by-product of processes extracting borax and other sodium compounds.

Production

There was a steady, upward trend in production from the low tonnage of 1932, 256,353 tons to 1941 when 434,237 tons were produced. In 1942, output soared to 672,324 tons with a slight decrease to 631,776 tons in 1943.

Purchases of rock salt from salt beds near Amboy, San Bernardino County, by a large magnesium plant in southern Nevada accounted for a large part of the increases of 1942 and 1943. Amount and value of annual production of salt as reported by California producers from 1887 is shown in the following tabulation:

Year	Tons	Value	Year	Tons	Value
1887	28,000	$112,000	1916	186,148	$455,695
1888	30,800	92,400	1917	227,825	584,373
1889	21,000	63,000	1918	212,076	806,328
1890	8,729	57,085	1919	233,994	896,963
1891	20,094	90,303	1920	230,638	972,648
1892	23,570	104,788	1921	197,989	832,702
1893	50,500	213,000	1922	223,238	819,187
1894	49,131	140,087	1923	275,979	1,130,670
1895	53,031	150,576	1924	318,800	1,159,137
1896	64,743	153,244	1925	284,068	949,826
1897	67,851	157,520	1926	311,761	1,124,978
1898	93,421	170,855	1927	263,028	639,127
1889	82,654	149,588	1928	340,580	1,024,656
1900	89,338	204,754	1929	392,039	1,711,523
1901	126,218	366,376	1930	347,945	1,167,487
1902	115,208	205,876	1931	330,951	1,233,567
1903	102,895	211,365	1932	256,353	918,480
1904	95,968	187,300	1933	321,312	1,251,024
1905	77,118	141,925	1934	332,194	1,222,810
1906	101,650	213,228	1935	365,711	1,230,480
1907	88,063	310,967	1936	398,249	1,227,505
1908	121,764	281,469	1937	370,431	1,044,325
1909	155,680	414,708	1938	395,746	1,099,737
1910	174,920	395,417	1939	417,956	1,174,386
1911	173,332	324,255	1940	462,282	1,290,728
1912	185,721	383,370	1941	434,237	1,180,929
1913	204,407	462,681	1942	672,324	1,922,991
1914	223,806	583,553	1943	631,776	1,695,231
1915	169,028	368,737			
			Totals	12,233,270	$37,477,920

Postwar Outlook and Employment

While demands for salt for strictly war industries are decreasing and will decrease further until after the war, nearly all producers will require larger tonnages than those of prewar years.

There were about 500 persons employed in California salt production in 1943 and no material change in this number is anticipated by the industry in the postwar period.

References:

Salt: Mineral Abstracts. Calif. Div. Mines. Unpublished.

Phalen, W. C. Salt Resources of the U. S. Bull. 669. U. S. Geol. Surv. 1919.

Phalen, W. C. Technology of Salt Making in the U. S. Bull. 146. U. S. Bur. Mines. 1917.

Industrial Minerals and Rocks. A.I.M.E. 1937.

SEMI-PRECIOUS STONES AND CRYSTALS

Gem materials mined in the State include tourmaline, kunzite, beryl, aquamarine, morganite, californite, topaz, rhodonite, garnet, chrysoprase, tourquoise, semi-opal, sapphires, jasper and moss agate. Diamonds also have been found in Amador, El Dorado, Nevada, Butte and Plumas counties. They are occasionally encountered by placer miners in washing stream gravels for gold.

The banner year for production of gem materials was 1906 when the value of output reached $497,090, a large part being attributed to tourmaline mines in San Diego County, and chrysoprase in Tulare County. For the past 10 years production has ranged from a few hundred to a few thousand dollars annually.

Statistics of production in 1943 show $329,868 but this figure includes quartz crystals and iceland spar required for war purposes and not accurately to be classed as gems.

Quartz crystals and iceland spar are required for their optical or piezoelectric properties.

Fifty men were employed in this work in 1943, but termination of the war will likely reduce the output again to nominal figures.

SILICA

Silica is the principal constituent of all natural sand, but included in this classification for the purposes of this report is glass sand, and quartz. The figures include some quartz and sand used as an abrasive, the output of ganister (quartzite) from a single quarry, but excludes quartz crystals.

Production of quartz rock came from 5 properties of which two are located in San Bernardino County, and one each in Los Angeles, Mariposa and Stanislaus counties.

Glass sand came from 5 operations, one each in Contra Costa, Monterey, Orange, Riverside and San Bernardino counties. One additional operation in Monterey County will be added with the completion of a plant by the Owens Illinois Glass Company.

Uses. Markets

Glass sand as the name implies is chiefly used in the manufacture of glass. In California statistics, this classification includes some material used for other purposes such as an abrasive and for filtering. For glass making the sand must be washed and ranges in specification from one containing less than one percent impurities and but a trace of iron oxide to the material containing as little as 95 percent SiO_2; and, in the case of some sand used for amber or green bottles, may contain as much as one per cent Fe_2O_3.

The term quartz, which usually refers to vein quartz includes sandstone and quartzite. Aside from its use in glass manufacture, it is ground or pulverized chiefly for ceramic purposes and as an abrasive. There are, however, a multiplicity of other uses in industry.

Sales of quartz are made largely to grinding mills or to consumers equipped with grinding facilities. The war-time manufacture of ferrosilicon for use in magnesium production accounted for more than 50 percent of the 1943 output. This use, in California, has now been discontinued.

Glass sand in some cases is ''captive'' tonnage, i.e., that consumed by the producer. In other cases sales are made direct to the consumer.

Prices

There are no open market quotations on either quartz or glass sand.

The value of glass sand reported by producers in 1943 ranged from about \$2.50 to \$4.25 per ton with an average value of \$3.65 per ton at the pit.

Quartz output had a reported value ranging from \$3.00 to \$5.00 per ton for independent production. Captive production was reported at considerably lower figures. The average value excluding captive tonnage was \$3.06 per ton at the mine.

Ground quartz or silica sand sells from \$15 to \$40 per ton depending upon percentage of silica, color and fineness.

Tariff Rates

Silica, crude, not specially provided for, has an import duty of \$3.50 per ton.

Sand containing 95 percent or more of silica and not more than six-tenth of 1 percent of oxide of iron and suitable for use in the manufacture of glass has an import duty of \$1 per ton.

Character and Extent of Reserves

Quartz rock occurs abundantly in many parts of the state. Potential reserves are large enough to supply needs indefinitely. The ''place'' value of this material is, however, so low that most of the tonnage is out of the economic limits of present markets.

Glass sand reserves are sufficient to maintain the present rate of production for 50 years or more.

Production

In 1943 output of quartz amounted to 56,263 tons, that of glass sand 105,055 tons. The production of both materials was much higher than normal, due, in the case of quartz, to the manufacture of ferro-silicon and, in glass sand, to the use of glass containers which replaced tin and other metals normally used in packaging of merchandise.

Statistics of production of the Division of mines given below do not differentiate between quartz and silica sand, both being combined to produce the totals shown.

Total Silica Production in California, by Years

Year	Tons	Value	Year	Tons	Value
1899	3,000	$3,500	1922	9,874	$31,016
1900	2,200	2,200	1923	7,964	30,420
1901	5,000	16,250	1924	6,808	35,006
1902	4,500	12,225	1925	12,498	96,780
1903	7,725	7,525	1926	30,010	104,317
1904	10,004	12,276	1927	24,636	94,762
1905	9,257	8,121	1928	14,814	66,679
1906	9,750	13,375	1929	18,686	79,210
1907	11,065	8,178	1930	17,802	71,380
1908	9,255	22,045	1931	43,330	182,769
1909	12,259	25,517	1932	33,997	136,324
1910	19,224	18,265	1933	70,329	266,520
1911	9,620	8,672	1934	70,432	296,643
1912	13,075	15,404	1935	70,835	297,272
1913	18,618	21,899	1936	77,830	310,278
1914	28,538	22,688	1937	84,313	348,987
1915	28,904	34,322	1938	63,167	278,676
1916	20,880	48,908	1939	86,229	349,074
1917	19,376	41,166	1940	101,041	376,723
1918	23,257	88,930	1941	137,660	514,266
1919	18,659	101,600	1942	193,174	692,762
1920	25,324	96,793	1943	161,318	533,434
1921	10,569	49,179			
			Totals	1,655,796	$5,861,336

Postwar Outlook. Employment

There is mixed opinion as to probable postwar activity and while the same rate of production and employment is expected by several operators, others forecast a decrease of 25 to 40 percent in production and a drop of 15 percent in employment.

Reference to production tables show that while in 1943 there was a falling off in output as compared with 1942, the industry was still shipping more than twice the average annual amount for five years prior to 1940.

The excavation and washing of glass sand employed 78 men in 1943 while 40 men were engaged in quartz rock mining, a total of 118.

Considering the probable resumption of the use of tin and other metal packaging for some purposes, and the cessation of ferro-silicon production on the scale required for magnesium production by the Pidgeon process, not more than 75 men may be required in postwar times.

References:

Weigel, W. M. Technology and Uses of Silica and Sand. U. S. Bur. of Mines. Bull. 266. 1927.

Feldspar and Silica. California Deposits. 27th Rept. State Min. Cal. Div. of Mines. 1931.

Industrial Minerals and Rocks. A. I. M. E. 1937.

SILLIMANITE GROUP

ANDALUSITE—KYANITE—DUMORTIERITE

Sillimanite, kyanite and andalusite are silicates of aluminum (Al_2SiO_5) of similar chemical composition but of different physical characteristics. Andalusite has been found in Alpine, Fresno, Kern, Mariposa, Mono, Nevada and Riverside counties. Sillimanite occurs in Inyo, Mariposa, San Bernardino and San Diego counties. Kyanite is mined in Imperial county. Dumortierite, a basic aluminum boro-sillicate, of somewhat different chemical analysis than andalusite and sillimanite, may be mixed with andalusite in manufacturing. It occurs in Imperial and San Diego counties.

Andalusite is mined in Dry Creek Canyon in the White Mountains of the Inyo Range in Mono County, by Champion Sillimanite Company, Inc., a subsidiary of Champion Spark Plug Co., of Detroit, Michigan.

The kyanite deposits at Ogilby, Imperial County, are operated by the Vitrefrax Corporation and shipments made to their manufacturing plant at Los Angeles. It is also found in Los Angeles and Tuolumne counties.

Uses

Andalusite from the Mono County deposits is used in the manufacture of automobile spark plugs and for high-tension electric insulators, laboratory ware and a variety of porcelains which can be subjected to sudden and extreme changes in temperature without damage.

Kyanite from Imperial County is shipped to Los Angeles where it is ground and furnishes a substantial part of the mix for an electric furnace operation in which mullite is produced. The mullite is used in the manufacture of spark plug porcelain, and in refractories.

The presence of tourmaline, iron oxide, and a large amount of quartz, presents a problem of research to eliminate or reduce these impurities.

Dumortierite, although occurring in quantities that may be of commercial importance, is not mined in California at present. It is used as a refractory and is sometimes mixed with other aluminum silicate minerals.

Sillimanite also is not mined nor used in California.

Markets. Prices

The glass manufacturers in California could use substantial amounts of kyanite if material of a suitable grade, purity and physical properties could be produced.

Andalusite is entirely "captive" tonnage and is shipped to the Detroit plant of the Champion Spark Plug Company.

There are no fixed specifications for kyanite, but specific gravity should be above 3.00 to be classified as high grade, and quartz should be as low as possible. The iron minerals, pyrite, magnetite and limonite, if present, must be reduced to only a trace.

Prices of kyanite were fixed by O.P.A. at figures prevailing in March, 1942, but the ceiling price for glass grades was later revised.

The E. & M. J., Metal and Mineral Markets (October 1944), gives quotations as follows:

Crude \$19.00; 35 mesh \$37.50; Glass grades \$40.00 nominal.

Consumption in the United States of kyanite from all sources amounts to 10,000 to 20,000 tons annually of which around 40 percent is produced in the United States.

India is the most important foreign source.

Dumortierite is not produced in California but output of this mineral from deposits of Champion Sillimanite Company at Oreana, Pershing County, Nevada, replaces or supplements to some extent, andalusite from the company's operations in Mono County, California.

The use after the war of gasoline of higher octane rating than heretofore may call for spark-plug materials of higher refractory character and in larger volume.

Character and Extent of Ore Reserves

The upper deposits of andalusite from which Champion Sillimanite Company has obtained much of its production to date are reported to be approaching exhaustion. The lower deposits in the same locality, although reputed to be of somewhat lower grade, are expected to continue to supply andalusite for the Champion Spark Plug Company indefinitely. There are other known occurrences in the White Mountains area of Mono County, but these remain undeveloped due to a lack of demand and because of difficult transportation.

The kyanite deposits in Imperial County operated by Vitrefrax Corporation have been described as being a low rounded hill about 650 feet wide and 2600 feet long averaging 25 percent kyanite in a matrix of quartz.

The vein material is described as ranging from 10 to 200 feet in width and the material mined is said to contain 33 percent kyanite.

Production

Separate figures for andalusite and kyanite are not reported.

The total output of the andalusite-kyanite-sillimanite group is as follows:

Total Sillimanite Group Production of California, by Years

Year	Tons	Value	Year	Tons	Value
922, 923, 924	4,584	\$98,790	1933, 1934	3,035	\$69,026
925, 926	4,810	203,000	1935, 1936	3,112	89,214
927, 928	4,276	76,000	1937, 1938	2,681	70,477
929, 930	4,359	198,893	1940, 1941	1,344	23,391
931, 932	1,244	21,800	1942, 1943	4,046	79,355
			Totals	33,491	\$929,946

Postwar Employment

It seems probable that at best not more than 30 men are likely to be engaged directly in these operations under postwar conditions.

Recommendations

It is recommended that the Division of Mines make a detailed study of the character, extent, beneficiation and economics of these minerals with attention particularly to the deposits of andalusite in Mono County and kyanite in Imperial County.

References:

Andalusite, Sillimanite, Kyanite Group. Mineral Abstracts. Cal. Div. of Mines. Unpublished.

Information Circular 6255. U. S. Bureau of Mines.

Ogilby Kyanite Deposits, Rep. XXVII. Cal. Div. of Mines, 1931.

Jeffery, Joseph A., The Sillimanite Group of Minerals, Rep. XXXIX. Cal. Div. of Mines, 1943.

SODA ASH—SALT CAKE

Soda Ash is the commercial anhydrous carbonate of soda.

Salt Cake is sodium sulphate.

Both soda ash and salt cake are extracted from brines of alkali ''dry lakes'' in California. Four operations yielding soda ash are located at Owens Lake in Inyo County, and Searles Lake in San Bernardino County.

Salt cake is produced at Searles Lake as an incident in the production of soda ash, potash, borax and other products. It is also produced at Dale Lake, San Bernardino County, and has in the past been shipped from an operation at Mecca, Imperial County.

Uses

Sodium carbonate, as soda ash has many uses and is one of the basic materials of the chemical industry. Its largest uses are in the manufacture of glass, soap, cleansers, pulp and paper, and the preparation of other sodium chemicals.

Sodium sulphate is used chiefly in the manufacture of kraft pulp. Lesser amounts are consumed in the dyeing industry and in glass manufacture.

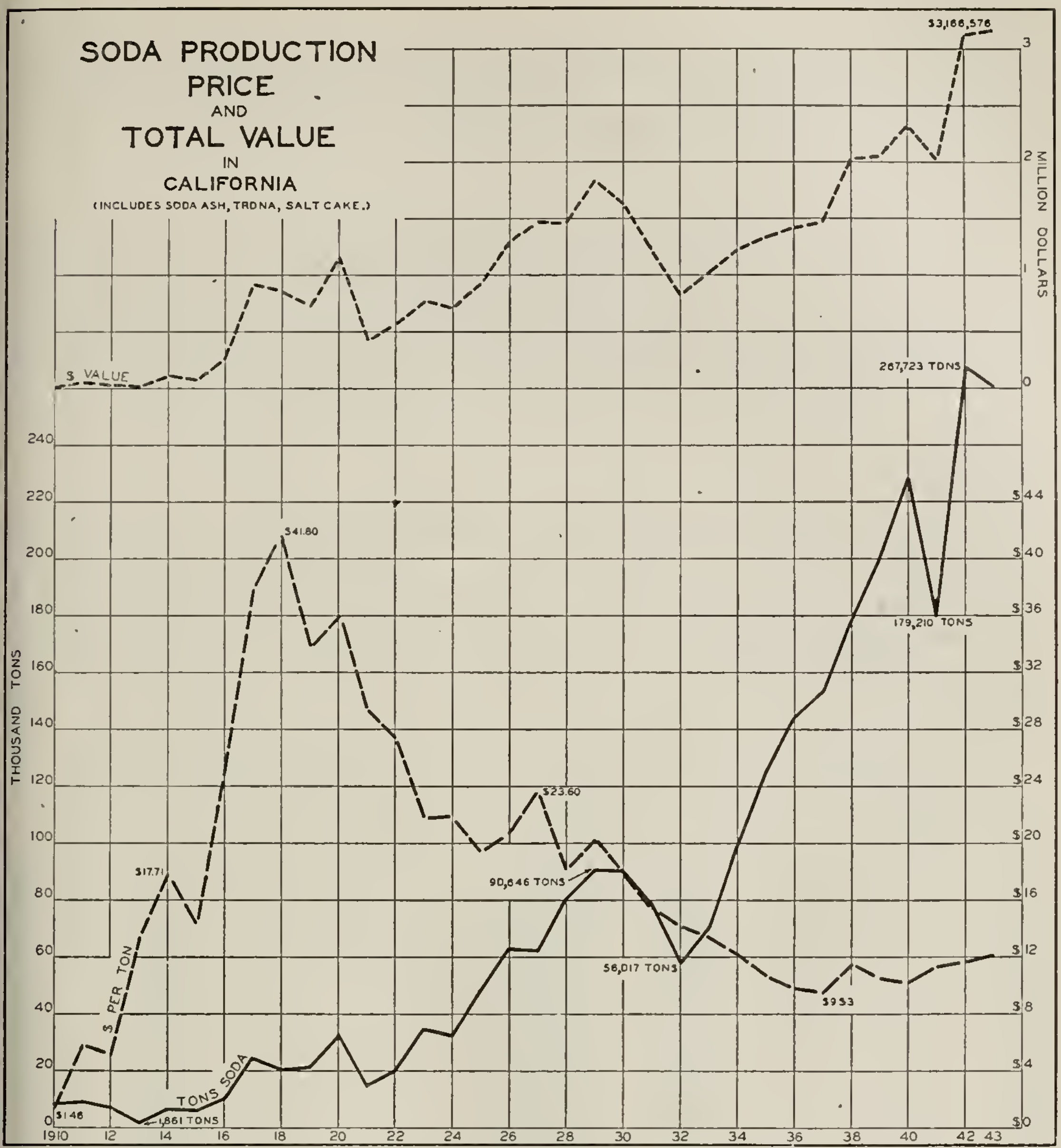
Markets

Soda ash is being brought into California under war conditions to supplement supplies, although normally local output is sufficient.

Salt cake is shipped by California producers to eastern and southern markets where it is sold in competition with manufactured salts from plants in those areas. No eastern or southern salt cake is able to compete on the Pacific Coast.

Sales are made both direct to large consumers and through dealers.

Most of the Californian output comes from brines from which there are also extracted borax, potash, soda ash and other materials.



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Prices

Soda Ash

There are no published quotations on the Pacific Coast.

Oil, Paint and Drug Reporter, Oct. 2, 1944, however, quotes carload lots f.o.b. works at \$1.05 - \$1.13 per 100 lbs. for light ash, \$1.15 for dense ash, on a basis of 68 percent Na_2O.

The average value of soda ash reported by California producers in 1942 was \$11.67 per ton f.o.b. works and \$12.15 per ton in 1943. Eastern soda ash is sold f.o.b. California at substantially higher figures.

Salt Cake

Salt cake is quoted by Oil, Paint and Drug Reporter, Oct. 2, 1944 at \$15.00 per ton in bulk, f.o.b. works, carload lots.

As in the case of soda ash, value furnished by producers is far under that of the quoted New York prices.

The average value of salt cake produced in California in 1942 was \$7.12 per ton and in 1943 about \$6.70 per ton f.o.b. works.

Tariff Rates

Soda ash, hydrated or sal soda, and mono-hydrated, has an import duty of ¼ of 1¢ per pound.

Salt cake, crude, is imported duty free.

Character and Extent of Reserves

The reserves of natural sodium carbonate and sodium sulphate have not been determined, but they are extensive and certainly suffcient to maintain the present rate of output for many years. Like other saline salts with which much of the supply is recovered concurrently, their economic availability is related to efficiency of operations as well as price.

Production

The production table shows the combined output of soda ash and salt cake.

The output of soda ash and trona in 1942 was 145,957 tons, that of 1943 was 165,696 tons.

The output of salt cake in 1942 was 121,766 tons and in 1943 94,894 tons.

Soda Ash, Trona and Salt Cake Total Production of California, by Years

Year	Tons	Value	Year	Tons	Value
1894	1,530	$20,000	1920	32,407	$1,164,898
1895	1,900	47,500	1921	14,828	438,996
1896	3,000	65,000	1922	20,084	573,661
1897	5,000	110,000	1923	34,885	764,284
1898	7,000	154,000	1924	32,536	711,796
1899	10,000	250,000	1925	48,625	947,649
1900	1,000	50,000	1926	63,333	1,305,802
1901	8,000	400,000	1927	62,571	1,478,239
1902	7,000	50,000	1928	80,838	1,469,297
1903	18,000	27,000	1929	90,646	1,838,657
1904	12,000	18,000	1930	90,122	1,627,344
1905	15,000	22,500	1931	78,701	1,217,811
1906	12,000	18,000	1932	58,017	826,369
1907			1933	70,598	1,019,130
1908	9,600	14,400	1934	99,380	1,219,561
1909	7,712	11,593	1935	125,504	1,341,045
1910	8,125	11,862	1936	144,314	1,412,788
1911	9,023	52,887	1937	153,685	1,461,057
1912	7,200	37,094	1938	178,105	2,023,610
1913	1,861	24,936	1939	200,049	2,055,608
1914	6,522	115,396	1940	228,108	2,339,639
1915	5,799	83,485	1941	179,210	2,028,718
1916	10,593	264,825	1942	267,723	3,125,078
1917	24,505	928,578	1943	260,590	3,166,576
1918	20,447	855,423			
1919	21,294	721,958	Totals	2,948,970	$39,912,050

Postwar Outlook—Employment

The outlook for soda ash and salt cake is much the same as that for borax. Demand may, however, be affected by a reduction in glass manufacture without corresponding increase in other industries. Inasmuch as most of the sulphate and all of the soda ash is recovered along with other products which expect to maintain the present rate of output, no reduction in employment is expected. Estimates of employment have been placed under borax.

References:

Gale, H. S. Salines in the Owens, Searles and Panamint Basins, Southeastern California. U. S. Geol. Surv. Bull. 580. 1915.

Harness, C. L. and Coons, A. T. Sodium Carbonate. U. S. Bur. Mines. Info. Cir. 7212. 1942.

STONE, MISCELLANEOUS

This title has been used for some years by the California Division of Mines to describe that branch of the mineral industry which includes crushed and broken rock, sand and gravel and some products of secondary importance such as paving blocks and grinding pebbles. There is also included, broken rock, railroad ballast, riprap (irregular heavy broken rock) macadam (road stone) and other rock materials other than dimension stone. This grouping has been brought about by the utilization, particularly in California, of river stone as one of the chief sources of crushed rock. Thus a single operation may produce sand and gravel while boulders are the materials from which crushed rock is derived.

Stone and its disintegration products, sand and gravel, are the most widely distributed of all mineral products, and every county in the State, probably every county in the United States, has produced more or less of these products.

While the industry in California is obviously much older, records of production were not kept until 1893 since which time output has reached the sum of about $400,000,000, making it fifth in importance in dollar value, and exceeded only by petroleum, gold, cement and natural gas.

In quantity, reaching over 600,000,000 tons, it has been one of the largest sources of freight for railroads and trucks, and its production, transportation and use in roads, ballast, fills, and concrete construction has been one of the most important bases of employment.

In addition to the material of record, the State, counties and many other government subdivisions, use considerable quantities in road work, but such production is not usually reported.

Other materials classified under Stone, Miscellaneous, include the following:

Grinding Pebbles

These were in 1943 derived from a single operation located in San Diego County. The output is but a few hundred tons per year. There is also occasional production from Calaveras County.

Paving Blocks

This is included in statistics as a commercial operation, although the sole producer in recent years has been the penitentiary at Folsom. Prior to 1916 the annual value from this as well as private operations exceeded $150,000. The passing of horsedrawn vehicles leaves but a small part of former demand as smooth pavements are preferred for motor traffic.

Sand

Molding or foundry sands are sands containing clay or bentonite used in foundry cores and molds. They were produced in 1943 in Contra Costa, Orange, Riverside, Sacramento, San Diego, San Luis Obispo, San Mateo and Ventura counties.

Glass sands are discussed under silica.

All of the products in this group are of low "place value" and do not normally move far to the point of consumption. The importance of one county or another as a producer changes from time to time as large construction projects temporarily call for increased amounts from nearby sources. In 1943 Alameda led all other counties whereas Los Angeles had hitherto occupied first rank for many years. Shasta County occupied third position. Production during that year came from 47 counties with a total of 216 operations.

In addition to river stone, gravel and sand, 52 rock quarries in 27 counties supplied riprap, railroad ballast and other crushed rock during 1943. In some cases fine crushed rock is washed and screened to provide artificial sand. This is used in artificial stone facing for ornamental effect and for roofing granules.

For purposes herein, sand is considered unconsolidated granular material coarser than 200-mesh and finer than $\frac{1}{4}$ inch resulting from the natural disintegration of rocks. Gravel is similar material coarser than $\frac{1}{4}$ inch and finer than $3\frac{1}{2}$ inches.

Uses. Markets

Uses are so divergent in character and so well known that they are not repeated herein. Sales are usually made direct to the contractor or consumer and many contractors operate their own quarries and gravel pits.

Considerable railroad ballast is produced by the railway companies for their own operations and the Southern Pacific, Northern Pacific, Santa Fe and Great Northern each have one or more operations. Building material dealers sometimes carry relatively small stocks of sand and gravel, and more rarely crushed rock, for exwarehouse deliveries for small jobs.

Prices

There are no open market quotations on rock products, the bulk of material being sold on contract or negotiative basis.

The average value of these materials reported by producers in 1943, was as follows:

Sand and gravel	$0.633 per ton
Road and ballast rock	0.733 per ton
Crushed rock for concrete	1.215 per ton
Average all crushed rock	0.731 per ton
Rubble—riprap	1.148 per ton
Molding sand	3.942 per ton

Production

The volume production of sand and gravel dropped 22 percent, crushed rock 38 percent and there was an average decline of 27 percent in all miscellaneous stone in 1943 as compared with the previous year.

This represented the completion of various military and warplant construction, and brought the level of activity to a point somewhat under that of 1941. It was still substantially higher, however, than that of any prewar year.

Production of Sand and Gravel in California, by Years

Year	*Tons*	*Value*
1935	6,531,830	$3,445,881
1936	11,442,112	6,004,713
1937	12,303,190	6,673,976
1938	12,983,957	6,957,377
1939	12,643,572	6,392,617
1940	16,279,303	7,769,250
1941	24,836,151	12,127,785
1942	27,796,566	15,295,252
1943	21,672,727	13,726,756

Production of Crushed Rock of California, by Years

Year	*Tons*	*Value*
1935	2,511,046	$2,125,160
1936	17,085,967	10,573,525
1937	15,951,650	10,243,707
1938	6,067,720	4,776,661
1939	6,050,224	3,924,170
1940	7,904,883	4,412,314
1941	9,789,884	7,432,098
1942	17,659,519	11,986,090
1943	10,926,729	7,989,467

Miscellaneous Stone Production of California, by Years

The amount and value, annually, of crushed rock (including macadam, ballast, rubble, riprap, and that for concrete), and sand and gravel, since 1893, follow:

Crushed Rock, Sand and Gravel, by Years

Year	Tons	Value	Year	Tons	Value
1893	371,000	$456,075	1919	6,919,188	$3,678,322
1894	661,900	664,838	1920	9,792,122	6,782,414
1895	1,254,688	1,095,939	1921	10,914,145	7,834,640
1896	960,619	839,884	1922	13,049,644	10,366,231
1897	821,123	600,112	1923	19,840,301	15,379,838
1898	1,177,365	814,477	1924	21,451,129	15,962,476
1899	964,898	786,892	1925	23,819,137	17,407,113
1900	789,287	561,642	1926	24,987,606	19,859,261
1901	530,396	641,037	1927	25,126,691	18,912,994
1902	2,056,015	1,249,529	1928	27,471,794	17,328,044
1903	2,215,625	1,673,591	1929	27,104,618	17,840,159
1904	2,296,898	1,641,877	1930	23,514,168	16,430,027
1905	2,624,257	1,716,770	1931	15,848,313	11,848,531
1906	1,555,372	1,418,406	1932	11,361,564	7,183,643
1907	2,288,888	1,915,015	1933	11,181,156	6,871,581
1908	3,998,945	3,241,774	1934	16,148,275	7,131,330
1909	5,531,561	2,708,326	1935	9,041,876	5,571,041
1910	5,827,828	2,777,690	1936	28,528,079	16,578,238
1911	6,487,223	3,610,357	1937	28,254,740	16,917,683
1912	8,044,937	4,532,598	1938	19,051,677	11,734,038
1913	9,817,616	4,823,056	1939	18,693,896	10,316,787
1914	9,288,397	3,960,973	1940	24,184,186	12,181,564
1915	10,879,497	4,609,278	1941	34,626,035	19,559,883
1916	9,951,089	4,009,590	1942	45,455,085	27,281,342
1917	8,069,271	3,505,662	1943	32,599,456	21,716,223
1918	6,641,144	3,325,889			
			Totals	614,070,820	$399,854,680

Postwar Outlook. Employment

Large quantities of these products have been required in military roads and structures during the war. These needs will likely decrease as the war progresses, although the transfer of operations into the Pacific area may provide some temporary cushioning of the drop which might be expected between completion of military needs and resumption of peacetime construction. The pattern of Portland cement will probably be closely followed by the stone industries.

Although there was a drop of 27 percent in output in 1943 as compared with 1942, in crushed rock, sand and gravel, rubble and riprap combined, these industries continued to be the second largest employers of labor, exceeded only by clay and clay products. A total of 3,313 men were employed in 1943. Producers estimate that there will be little change in the number during the postwar period.

References:

Thoenen, J. R. Info. Circulars 6668, 6669, 6798, 6814, 6826, 6875, 6879. U. S. Bur. Mines.

Industrial Minerals and Rocks. A. I. M. E. 1937.

STRONTIUM

Strontium occurs as the sulphate of strontium, celestite, and the carbonate, strontianite. It is found in San Bernardino, Imperial and Inyo counties.

The strategic character of the material is indicated by the fact that production ceased in 1918 at the termination of World War I and was not resumed until 1939. Since then output has averaged something under 2000 tons per year of an average value of $16.42 at the mine shipping point.

Some celestite is now sold for well-drilling muds and this phase of the business may continue after the war. However, it should be noted that it is used as a substitute for barite, the usual selling price of which is hardly 50 percent of the average price quoted for celestite.

The industry at present employs about 10 men.

Tariff Rates. Strontium: Carbonate, precipitated, nitrate, and oxide, has an import duty of 25 percent ad valorem.

Strontianite or mineral strontium carbonate and celestite or mineral strontium sulphate, is imported duty free.

Reference:

Strontium: Mineral Abstracts. Calif. Div. of Mines. Unpublished.

SULPHUR

Sulphur has been found to some extent in Alpine, Colusa, Imperial, Inyo, Kern, Lake, Sonoma, Tehama and Ventura counties.

Production in recent years has come from Alpine, Imperial and Inyo counties, chiefly from the latter.

The average production during the past 10 years has been around 5000 tons per year of an average value of about $16 at the mine or about $80,000 per year.

This does not, however, imply a corresponding deficiency in sulphur materials for the manufacture of acid. California pyrite and other sulphide minerals are commonly used for this purpose and supply an equivalent of over 40,000 tons a year or more in sulphur.

In addition to this, two oil refineries recover the sulphur content of the petroleum as hydrogen sulphide. In each case this is piped to an adjoining chemical plant and is burned for the production of sulphuric acid. The sulphur equivalent recovered in this way averages about 66 tons per day, or over 25,000 tons per year.

Tariff Rates: Sulphur in any form, and sulphur ore, containing more than 25 percent sulphur, is imported duty free.

Total Production of Sulphur in California *

Year	Tons	Value	Year	Tons	Value
1865, 1866, 1867	941	$53,500	1934	4,412	$67,656
1868 to 1922			1935, 1936	5,308	61,603
1923, 1924	185	4,071	1937, 1938	9,451	120,010
1925 to 1928			1939	4,811	73,741
1929, 1930, 1931	265	9,025	1940	8,803	105,619
1932, 1933	1,991	32,838	1941	9,750	209,296
			1942, 1943	4,270	92,040
			Totals	50,187	$829,399

* Not including pyrite or hydrogen sulphide from oil refineries.

Postwar Outlook

Some resumption of mining of elemental sulphur may be expected after the war but such operations employ but a few men.

Employment in pyrite mining is treated under that subject. Sulphur obtained in oil refineries is a by-product and is not separately listed.

TALC AND STEATITE

By J. Clark Sutherland [1]

Talc, steatite and pyrophyllite are minerals of similar character and physical properties. Chemically, however, talc and steatite are hydrous magnesium silicates; pyrophyllite is hydrous aluminum silicate.

Talc and steatite occur in widely scattered localities throughout the length of California, being found in 28 counties. Practically all of the production, however, comes from Inyo County, which has six producing mines, and from San Bernardino County with four producing mines.

Soapstone was produced in minor amounts, a few hundred tons a year, by one operation in Amador County and one in El Dorado County.

Pyrophyllite occurs in three localities all of which have been intermittently operated producing a relatively small tonnage. Two deposits occur in the White Mountains north of Bishop in Mono County, and the other in San Bernardino County east of Victorville.

[1] Geologist, Pacific Clay Products, Los Angeles.

Uses

Talc is used as an extender in paint; as a loader in paper; for roofing granules; in ceramics, electrical insulators, white ware and wall-tile bodies; as a filler in many industries such as rubber, cloth, linoleum, oilcloth, polishes, and so on; and as an absorbent, lubricant and dusting material. The absorbent quality of both talc and pyrophyllite has recently led to a widespread use as a carrier for chemicals used as insecticides, for example, the widely publicized D.D.T. delousing powder used in the anti-typhus campaign in Naples.

Steatite is a high-in-talc massive soapstone of quite rigid specifications. Its primary use is in high-freqency electrical insulators. The wide use of radar and other electronic devices in connection with the war effort has increased the demand for this type of material more than 12 times.

At the onset of the war, the War Production Board placed a limitation order on steatite talc. In April, 1943, these restrictions were lifted but control was established over the production and grading of steatite talc and a plan of inventory control was placed in effect.

The persistent rumor that military purchases of these minerals have increased their production many times is not true. Early in the war the Army purchased about 15,000 tons of talc which was used to simulate chemicals used for decontamination. The Navy, which formerly used 50 to 100 tons of talc per month in paint, has increased that amount to 500 tons per month. A considerable proportion of the talc purchased by the Army has since come onto the market in course of the surplus disposal program. The Naval uses for talc will unquestionably subside to near prewar levels after the war.

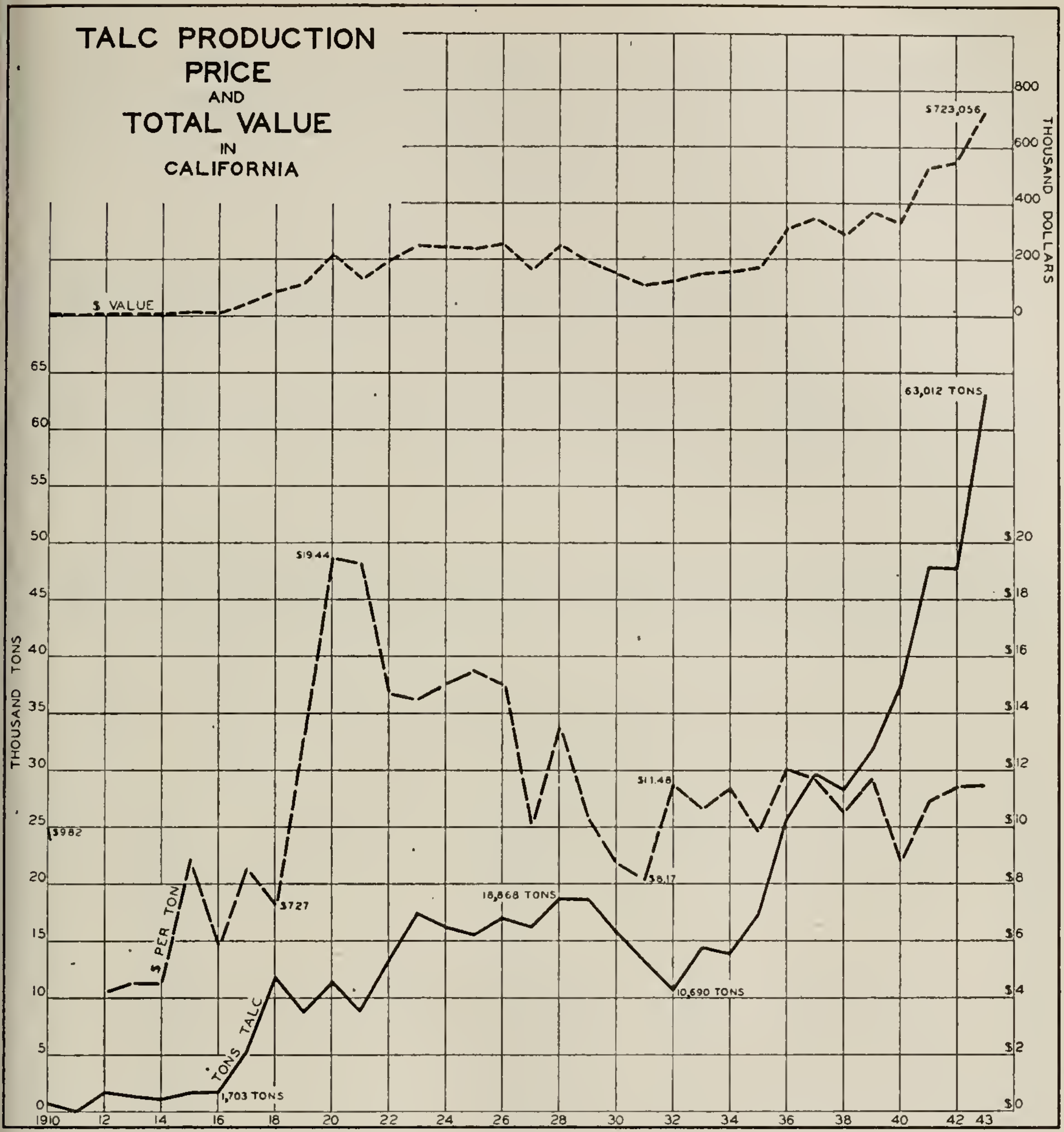
In 1942, the last year in which the proportions of uses were available, the United States consumption was distributed as follows:

Uses	Percent
Paints	32
Ceramics	13
Rubber	10
Roofing	13
Paper	8
Toilet preparations	5
Insecticides, foundry facings, crayons and other uses	19

Pyrophyllite, because of its similar physical characteristics has been utilized as a substitute for talc in many of the uses listed above where physical characteristics are the predominating requirement. Thus, pyrophyllite can be used in wall and floor tile, porcelain dinner ware; as a low-temperature refractory, and as a filler in paint, rubber, paper, et cetera.

Markets

Talc, steatite and pyrophyllite are usually marketed ground, and sometimes calcined, and according to very definite chemical or ceramic properties. Because of the considerable variations in these materials in occurrence it is common practice to mine, mix and market these materials in mixed batches which are constant in their characteristics within the individual batch and the properties of which are known by the consumer at the time of purchase.



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These materials are ordinarily bought direct by the consumer from concerns who are primarily in the mining and grinding business. They are also sold in small quantities through dealers in chemical supplies.

Prices

Prices of these minerals range from $4 per ton, f.o.b. mine, for roofing granule grades to $25 per ton for fine-ground materials low in iron and lime. When specially prepared as by calcining or extremely fine grinding to definite ratios of screen sizes, the prices show a proportionate increase to the cost of the process. Thus, fine-ground calcined steatite talc, held within rigid specifications as to screen size, chemical composition and ceramic properties, sells for as high as $75 per ton.

The average value reported by producers in 1942 was $11.79 per ton, f.o.b. mine.

Tariff Rates

Talc, steatite or soapstone: Ground, washed, powdered, or pulverized (except toilet preparations): Valued at not more than $12.50 per ton, has an import duty of 25 percent ad valorem; valued at not more than $14 per ton, 17½ percent ad valorem.

Character and Extent of Reserves

For low-grade materials meeting the specifications for such uses as roofing granules, impure fillers, etc., the known deposits of this material are adequate to supply markets within range of the existing demand for more than 50 years. The known reserves for higher-specification material such as steatite, is adequate for 25 years. Unquestionably, more deposits will be discovered within that time.

Production

Production in 1943 was the highest of record, exceeding 1942 by 15,230 tons, or 32 percent. The increased demand was largely due to accelerated industrial activity to meet military requirements.

Talc Production of California, by Years

Year	Tons	Value	Year	Tons	Value
1893	400	$17,750	1919	8,764	$115,091
1894			1920	11,327	221,362
1895	25	375	1921	8,752	130,078
1896			1922	13,378	197,186
1897			1923	17,439	252,661
1898			1924	16,179	242,770
1899			1925	15,465	239,084
1900			1926	17,004	255,645
1901	10	119	1927	16,218	164,744
1902	14	288	1928	18,668	251,372
1903	219	10,124	1929	18,676	193,493
1904	228	2,315	1930	15,861	154,258
1905	300	3,000	1931	13,472	109,940
1906			1932	10,690	122,880
1907			1933	14,451	153,668
1908	3	48	1934	13,920	158,606
1909	33	280	1935	17,332	170,830
1910	740	7,260	1936	25,643	309,287
1911			1937	29,657	347,772
1912	1,750	7,350	1938	28,346	290,810
1913	1,350	6,150	1939	31,820	372,078
1914	1,000	4,500	1940	37,433	329,425
1915	1,663	14,750	1941	47,935	525,396
1916	1,703	9,831	1942	47,782	545,509
1917	5,267	45,279	1943	63,012	743,056
1918	11,760	85,534			
			Totals	585,689	$6,910,954

Postwar Outlook. Employment

Notwithstanding that operations in 1943-1944 were at the highest levels of record, operators are almost unanimous in predicting still further increase in output during postwar years.

Ceramic uses, including radio, insulators for television and radar, porcelain bodies, tile and kindred wares in connection with postwar building, are the basis for this expectancy.

Employment in 1944 averaged about 200 men and the industry estimates that 250 will be required for peacetime operations.

References:

Talc, Steatite and Soapstone. Mineral Abstracts. Calif. Div. Mines. Unpublished.

Industrial Minerals and Rocks A.I.M.E. 1937.

Talc Pyrophyllite and Ground Soapstone. Minerals Yearbooks. U. S. Geol. Surv. 1940-41-42.

Johnson, Bertrand L. Marketing Talc, Pyrophyllite and Ground Soapstone. Inf. Circ. 7080. U. S. Bur. Mines. 1939.

TUNGSTEN

Tungsten ores, chiefly scheelite (calcium tungstate), are found in many parts of the state, including El Dorado, Fresno, Inyo, Kern, Mono, Madera, Nevada, San Bernardino, San Diego, Sierra, Tulare and Tuolumne counties.

Commercial production in California began in the Atolia District in San Bernardino and Kern counties in 1905, and this has been a source of tungsten almost continuously since except for the years 1921-1922 when imported material chiefly from China came in freely without a protective tariff.

While production from the Atolia and nearby areas continued in important amounts during 1943, the Bishop area in Inyo County has now become the chief source. Lesser amounts came from Tulare, Madera, Mono, Fresno, Nevada, El Dorado, San Diego and Riverside counties, and from eastern San Bernardino County near Goffs and Ivanpah, from Darwin in Inyo County, also Kernville and Weldon in Kern County.

Uses

The chief use of tungsten is in steel alloys. About 68 per cent is converted into ferro-tungsten for steel manufacture; about 17 per cent is charged directly into the steel bath; about 10 per cent is used in the manufacture of tungsten metal powder and the remainder, about 5 per cent, is used in the manufacture of tungsten chemicals for pigment and tanning.

The amount consumed in lamp and radio-tube filaments is small.

Markets

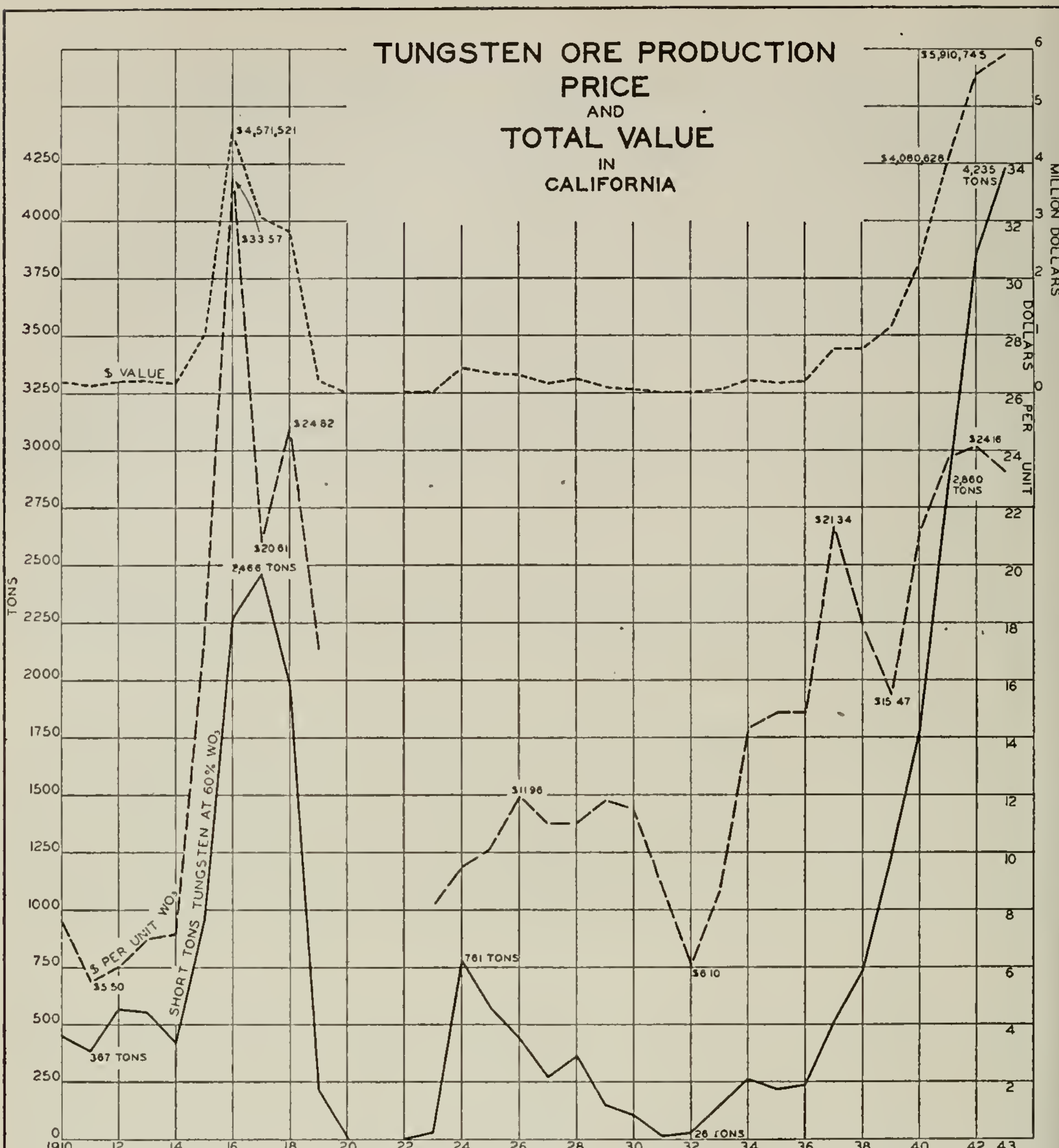
Manufacturers of tool-steel and ferro-alloys are the important purchasers of tungsten concentrates. Sales are also made to various dealers and beneficiation plants, particularly in small lots and in ores and concentrates requiring further treatment before going to the user.

Several of the larger mine operators purchase ores from other mines and U. S. Vanadium Corporation at Pine Creek, Inyo County, also treats concentrates produced elsewhere.

The Wah Chang Trading Company operates a plant on Long Island, New York, for the treatment of both foreign and domestic tungsten concentrates.

Prices

The price range of tungsten concentrates, normally sold on a basis of 60 per cent tungstic oxide (WO_3) has fluctuated during the past 25 years from $1.50 to $30. The graph herewith shows the influence of



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these fluctuations on the productive rate of California mines. Prices quoted in the Engineering & Mining Journal as of Sept. 21, 1944, were as follows:

Domestic: carload lots f.o.b. buyer's plant $24-$25 per unit

Chinese-Bolivian: duty paid f.o.b. New York $24 (nominal)

According to J. R. Van Fleet,[1] the current rate of production is substantially below domestic consumption and so long as this condition continues current prices are unlikely to be lower.

Purchases by Metals Reserve Company during 1943 were at $23 to $24 per unit for established mines and $30 for new operations on a basis of 60 percent ore or concentrate. Lower grade material commanded several dollars per unit less.

The premium price of $30 for new operations was, however, canceled by Metals Reserve Company in July, 1944.

The average price reported by California producers for 1943 was $23.25 per unit.

[1] J. R. Van Fleet, President, U. S. Vanadium Corporation, New York.

The Wah Chang Trading Company of New York has published a price list for sub-standard or off-grade tungsten ores ranging from \$182.85 per ton for 15 percent ores, to \$927.50 per ton for ores containing 50 per cent WO_3. This is based on a market price of \$24 per unit f.o.b. New York, less estimated costs including freight, insurance, financing, handling and treatment charges. This schedule also shows prices to be paid in the event of an increase or decrease in the current market price of \$24.00 per unit.

Under the Tariff Act of 1930, tungsten ore and concentrates carried a duty of 50 cents per pound for metallic tungsten contained therein, equal to \$8 per unit of one percent WO_3.

Character and Extent of Reserves

No estimate of reserves is available and developed tonnage is largely limited to two or three concerns. There are hundreds of known occurrences in the State most of them too small or too low-grade to warrant production even at the high price prevailing during the war.

With this widespread mineralization it is not too optimistic to expect that further new commercial sources may be found. Tungsten-bearing material to be considered of economic value must usually contain at least 0.5 percent tungstic oxide (WO_3) and be of such physical char-

PRODUCTION

Tungsten Production of California, by Years

Year	Tons at 60% WO_3	Value	Average unit WO_3 value
1905	57	\$18,800	\$5 50
1906	485	189,100	6 50
1907	287	120,587	7 00
1908	105	37,750	5 99
1909	577	190,500	6 50
1910	457	208,245	7 60
1911	387	127,706	5 50
1912	572	206,000	6 00
1913	559	234,673	7 00
1914	420	180,575	7 17
1915	962	1,005,467	17 42
1916	2,270	4,571,521	33 57
1917	2,466	3,079,013	20 81
1918	1,982	2,832,222	24 82
1919	214	219,316	17 08
1920			
1923	34	19,126	8 17
1924	781	446,009	9 52
1925	573	348,475	10 14
1926	441	316,560	11 96
1927, 1928	649	429,237	11 03
1929	150	106,280	11 81
1930, 1931	120	82,582	11 47
1932	26	9,509	6 10
1933	148	76,605	8 63
1934	261	224,417	14 33
1935	218	194,542	14 87
1936	236	210,819	14 89
1937	611	782,187	21 34
1938	732	876,860	17 92
1939	1,235	1,153,735	15 47
1940	1,784	2,267,135	21 15
1941	2,860	4,080,628	23 77
1942	3,385	5,586,770	24 16
1943	4,235	5,910,745	23 25
Totals	30,279	\$36,253,592	

acter that a reasonable recovery can be made. Ore of an analysis of 0.5 percent at $23.25 per unit would have a gross value of $11.62 per ton. If 70 percent of this could be recovered, the realizable value would be $8.13 per ton; a close figure for a small operation, especially if hauling and custom milling is required. The potential productive capacity of small operations dependent on high prices is indicated by their output in 1943 which exceeded 45,000 units or about 18 percent of the total.

As the result of a state-wide investigation of all known potential sources of tungsten, it is the opinion of J. R. Van Fleet[1] that undeveloped resources in California are extensive and may yield tungsten at the present rate of production indefinitely.

Postwar Outlook

Even a moderate drop in prices would probably close down all except three or four operations in the State as against 33 mines which produced in 1943. The drop in price from $30 to $24 for certain classes of producers has already eliminated a number of those who shipped earlier in 1944.

In 1942 and 1943 an unprecedented amount of prospecting for tungsten was carried on. This was due in part to high prices prevailing and in part to the increasing use of ultra-violet light in prospecting operations. Hundreds of portable lamp outfits are now in the hands of prospectors and provide a simple means of detecting scheelite. The wide distribution of these lamps and the simplicity of their use will result in continued search, notwithstanding a lower price of the product.

The largest producer in the State is the Pine Creek mine of the U. S. Vanadium Corporation with a normal payroll of between 400 and 500 men. This represented more than one-half of all those engaged in tungsten production in the State in 1943.

The company expects to continue at full operation during the first two or three years after the war with a full crew of 500 men.

The American Potash & Chemical Company at Trona, San Bernardino County, plans to erect a plant to extract sodium tungstate from its brine operations.

The retooling of United States industries for peacetime production and reconstruction in Europe after the war will continue to require large amounts of tungsten alloys and no sharp falling off in demand is anticipated for the immediate postwar period nor for possibly several years thereafter.

Possible Postwar Employment

While the number of operating mines will be far less than during wartime, the larger concerns have had to operate with reduced crews due to difficulty in obtaining labor. Bringing these crews up to normal basis is expected to offset to some extent, losses of employment by the closing of smaller mines. The postwar outlook is for the employment of about 725 men as against 825 in 1943. This figure may be supplemented by 50 to 100 men engaged in prospecting and exploration.

These figures include those engaged in processing operations at or near the mines. Small operations have from time to time produced

[1] Quoted above.

tungstic acid and other chemicals. The U. S. Bureau of Mines plans the reduction of local ores to tungsten metal at an experimental plant to be built near Redding.

References:

Li, K. C. and Wang, C. Y., Tungsten. Rheinhold Publishing Corp., 1943.

38th Annual Report. Cal. Div. of Mines. pp. 303-364. 1942.

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Tungsten, Mineral Abstracts. Cal. Div. of Mines. 1939.

APPENDIX A

DIRECTORY OF PRODUCERS OF METALLIC AND NON-METALLIC MINERALS IN CALIFORNIA

GOLD FOR YEAR 1940 FROM BULLETIN 121.
OTHER MINERALS FOR YEAR 1942 FROM BULLETIN 126

Note.—The producers of natural gas and petroleum will be found in the quarterly Summary of Operations, California Oil Fields, for July to December, 1942 (Vol. 28, No. 2).

DIRECTORY OF PRODUCERS

In addition to the list of producers contained herein, there are a large number of small operations which have not been included. Development enterprises not in the productive stage have also been omitted. Those listed are operations, the output of which has been not less than the following, for the year 1942:

Gold	200 ozs.
Copper	10,000 lbs.
Lead	10,000 lbs.
Zinc	10,000 lbs.
Silver	2,000 ozs.
Quicksilver	10 flasks
Tungsten	20 units
Chrome	50 tons 45% Cr_2O_3 Basis
Manganese	50 tons 45% Minimum Base

As many of the gold mines were closed in 1942, the list included herein are those which produced in 1940.

ANTIMONY

Operator	Address	Location of mine
Inyo County		
Bishop Antimony Mining Co., c/o R. S. Beatty, Jr.	P.O. Box 326, Bishop	Bishop
Darwin Antimony No. 1, James B. Utt	514½ N. Main St., Santa Ana	Darwin
San Benito County		
Stayton Mine, R. B. Knox (owner)	Hollister	Hollister

ASBESTOS

Operator	Product	Address	Location of mine
Napa County			
Kohler & Chase	a	26 O'Farrell St., San Francisco	Steel Canyon
Placer County			
S. G. Bowman	b	Forest Hill	Forest Hill
Shasta County			
Powhaton Mining Co.	b	Woodlawn, Baltimore, Md.	Hazel Creek

a. Chrysotile short fiber. b. Tremolite.

BARYTES

Operator	Address	Location of mine
Mariposa County		
Baroid Sales Division, National Lead Co.	830 Ducommun St., Los Angeles	El Portal
Nevada County		
Industrial Minerals & Chemical Co., Spanish Mine	836 Gilman St., Berkeley	Washington

BENTONITE (FULLER'S EARTH)

Operator	Address	Location of pit
Inyo County		
Kennedy Minerals Co.	2550 E. Olympic Blvd., Los Angeles	Olancha
Muroc Clay Co.	5525 Randolph St., Maywood	Olancha
Kern County		
Muroc Clay Co.	5525 Randolph St., Maywood	Muroc
San Bernardino County		
Baroid Sales Division, National Lead Co.	830 Ducommun St., Los Angeles	Hector
Kennedy Minerals Co.	2550 E. Olympic Blvd., Los Angeles	
Pacific Bentonite Mine, Louis Martinez	Box 374, Red Mountain	Red Mountain
F. E. Schundler & Co., Inc., Eyrite Mine	504 Railroad St., Joliet, Ill.	Barstow
San Diego County		
Standard Oil Co. of Calif.	Standard Oil Bldg., San Francisco	Palm Siding

BITUMINOUS ROCK

Operator	Address	Location of mine
Santa Barbara County		
Higgins Quarry, D. A. Sattler, Lessee	856 Arguello Rd., Santa Barbara	Carpinteria
Santa Cruz County		
Calrock Asphalt Co.	525 Market St., San Francisco	Majors

BORATES

Operator	Address	Location of property
Inyo County		
Pacific Alkali Co.	1209 Pacific Mutual Bldg., Los Angeles	Bartlett
United States Borax Co.	510 W. 6th St., Los Angeles	Death Valley
Kern County		
Pacific Coast Borax Co.	510 W. 6th St., Los Angeles	Kramer
San Bernardino County		
American Potash and Chemical Corp.	Trona	Trona
West End Chemical Co.	Latham Square Bldg., Oakland	West End

BROMINE

Operator	Address	Location of property
Alameda County		
Westvaco Chlorine Prod. Corp.	405 Lexington Ave., New York, N. Y.	Newark
San Bernardino County		
American Potash & Chem. Co.	Trona	Trona
San Diego County		
Westvaco Chlorine Prod. Corp.	405 Lexington Ave., New York, N. Y.	San Diego

CALCIUM CHLORIDE

Operator	Address	Location of mine
Imperial County		
Mullet Island Salt Works	Niland	Niland
San Bernardino County		
California Rock Salt Co.	2465 Hunter St., Los Angeles	Amboy

CALCIUM SILICATE

Operator	Address	Location of mine
Kern County		
Johns-Manville Product Corp.	Box 198, Long Beach	Code

CARBON DIOXIDE GAS

Operator	Address	Location of wells
Imperial County		
National Dry Ice Co.	1225 E. 8th St., Los Angeles	Niland
Natural Carbonic Prod., Inc.	748 E. Washington Blvd., Los Angeles	Niland
Mendocino County		
Caldri Ice Corp.	1168 Battery St., San Francisco	Hopland

CEMENT

Operator	Address	Location of mill
Calaveras County		
Calaveras Cement Co.	315 Montgomery St., San Francisco	San Andreas
Contra Costa County		
Henry Cowell Lime and Cement Co.	2 Market St., San Francisco	Cowell
Kern County		
Monolith Portland Cement Co.	Bartlett Bldg., Los Angeles	Monolith
Los Angeles County		
Blue Diamond Corp.	1650 S. Alameda St., Los Angeles	Los Angeles
Merced County		
Yosemite Portland Cement Co.	Merced	Merced
Riverside County		
Riverside Cement Co.	621 S. Hope St., Los Angeles	Riverside
San Benito County		
Pacific Portland Cement Co.	417 Montgomery St., San Francisco	San Juan
San Bernardino County		
California Portland Cement Co.	601 W. Fifth St., Los Angeles	Colton
Southwestern Portland Cement Co.	503 Roosevelt Bldg., Los Angeles	Victorville
San Mateo County		
Pacific Portland Cement Co.	417 Montgomery St., San Francisco	Redwood City
Santa Clara County		
The Permanente Corp.	Box 29, San Jose	Permanente
Santa Cruz County		
Santa Cruz Portland Cement Co.	Crocker Bldg., San Francisco	Davenport

CHROMITE

Operator	Address	Location of mine
Del Norte County		
Chas. H. Bennett	Crescent City	Crescent City
Clifford Johnson, Bonanza Chrome Mine	O'Brien, Ore.	Crescent City
Crescent Pacific Mining Co.	503 Market St., San Francisco	Crescent City
Doe Creek Mine, J. B. Isgrid & G. P. Lilley	Box 352, Crescent City	Crescent City
French Hill Mine, C. H. McClendon	Crescent City	Crescent City
W. E. & E. R. Gilmore	Syms Camp, via Crescent City	Syms Camp
High Plateau Group, Eugene R. Brown	O'Brien, Ore.	Crescent City
Pacific Chrome & Manganese Syndicate	667 Mission St., San Francisco	Crescent City
J. K. Remsen	P.O. Box 347, Grants Pass, Ore.	Crescent City
Tyson Chrome Mines, Ltd.	406 Montgomery St., San Francisco	Crescent City
El Dorado County		
Black Oak Chrome Mine, Russell J. Wilson	Midpines	Garden Valley
Pilliken Mine, Rustless Mining Corp.*	Farmers & Mechanics Bldg., Sacramento	Folsom
Pilliken Mine, United States Chrome Mines, Inc., A. H. Wild	Russ Bldg., San Francisco	Folsom
Volo Mining Co.	P.O. Box 586, Placerville	Placerville
Fresno County		
Clara H. Chrome Mines	Box 57, Clovis	Watts Valley
Glenn County		
Grey Eagle Mine, Rustless Mining Corp.	Farmers & Mechanics Bldg., Sacramento	Willows
Humboldt County		
Dorothea Reddy Moroney	Hamburg	Orleans
Mosquito Lake Mine, L. O. Wilder, Sr.	Orleans	Orleans
Mendocino County		
Ray F. Helmke	Alderpoint	Longvale
Placer County		
W. L. Braden	430 Vernon St., Roseville	Colfax
Bruce McCollum	1444 Franklin St., Oakland	Colfax
Sun Set Chrome Mine, C. L. Matthews	Forest Hill	Forest Hill
Victory Chrome, Chas. H. Brown	Box 326, Auburn	Colfax
War Metals Development, Ltd.	615 Capital National Bank Bldg., Sacramento	Forest Hill
Plumas County		
Plumas Manganese & Chrome Co.	Quincy	Quincy
White Pine Mine, E. R. Patterson	Oakley	Quincy

San Luis Obispo County		
Castro Chrome Associates	232 Montgomery St., San Francisco	San Luis Obispo
Sweetwater Chrome Mine, A. H. Wild	Russ Bldg., San Francisco	Morro Rock
Shasta County		
Coggins Mine, J. K. Remsen	Box 347, Grants Pass, Ore.	Castella
Little Castle Creek Chrome Mine, Manley M. Brown	Dunsmuir	Dunsmuir
Montrose Mining & Milling Co.	Russ Bldg., San Francisco	Castella
Round Bottom Chrome Mine, J. O. Enberg	Russ Bldg., San Francisco	
Siskiyou County		
John Baldwin	P.O. Box 294, Yreka	Cecilville
O. W. Costello	Yreka	
Fairview Chrome Mine, H. E. Ellickson	640 Lane St., Yreka	Hamburg
Haden & Stone	Callahan	Callahan
Lambert Chrome Mine, Basil Wild	Box 66, Fort Jones	Fort Jones
Taylor & Munko	711 Florence St., Dunsmuir	Dunsmuir
Tehama County		
McLaughlin & Applegarth	3001 Russ Bldg., San Francisco	Red Bluff
Trinity County		
Crow Creek Chrome Mine, A. H. Wild	558 Russ Bldg., San Francisco	Castella
John Diestelhorst, Jr.	1078 West St., Redding	Wildwood
Shasta Lilly Claim, Philip Munko	Castella	Castella
Seagraves Chrome Mine, Harry Moore & H. Robinson	Platina	Platina
Sunny Slope Mine, Joe Shafter	Knob	Knob
Yellow Pine Chrome Mine, Knowles & Winters	P.O. Box 261, Redding	Indian Valley
Tuolumne County		
Stuart & Everhart	707 Bank of America Bldg., Stockton	Jamestown

CLAY

(Including producers of crude clay; and manufacturers of brick, tile, porcelain, etc.)

Operator	Remarks	Address	Location of plant or pit
Alameda County			
California Pottery Co.	a, c	Niles	Niles
N. Clark & Sons	a, b	401 Pacific Ave., Alameda	Alameda
Kraftile Co.	a, b, c	Niles	Niles
M & S Tile Co.	a, c	Decoto	Decoto
Merritt Supply Co.	a	1289 Cedar St., Berkeley	Berkeley
Tesla Clay Sand Co.	c, f	503 Mills Bldg., San Francisco	Tesla
Westinghouse Elec. & Mfg. Co., Emeryville Porcelain Work	a	62d and Green Sts., Emeryville	Emeryville
Amador County			
M. J. Bacon	c	Ione	Carbondale
Cal. Mineral Products Co., Ione Clay and Sand Pit	c, f	Kohl Bldg., San Francisco	Ione
N. Clark & Sons	c	401 Pacific Ave., Alameda	Ione
Clay Corp. of California	c	1275 Harrison St., San Francisco	Ione
Ione Fire Brick Co., J. T. Roberts, Mgr.	b, c	1267 Russ Bldg., San Francisco	Ione
Butte County			
Gladding Bros. Mfg. Co.	c	S. 3d and Keys Sts., San Jose	Oroville
Calaveras County			
California Pottery Co.	c	Niles	Valley Springs
Contra Costa County			
American Radiator & Standard Sanitary Mfg. Co., H. W. Creeger, Mgr.	a	Box W., Richmond	Richmond
Port Costa Brick Works, C. G. Berg, Pres.	b	6th and Berry Sts., San Francisco	Port Costa
Stockton Fire Brick Co.	a, b	Russ Bldg., San Francisco	Pittsburg
Technical Porcelain & China Ware Co.	a	Manila and Kearney Sts., El Cerrito	El Cerrito
United Materials & Richmond Brick Co., Ltd.	a, b	Box 7, Richmond	Richmond
Fresno County			
Craycroft Brick Co.	a, b, c	Griffith-McKenzie Bldg., Fresno, R.F.D. 1, Box 6A	Fresno
Inyo County			
Kennedy Minerals Co.	e	2550 E. Olympic Blvd., Los Angeles	Olancha
Muroc Clay Co.	e	5525 Randolph St., Maywood	Olancha
Kern County			
American Minerals Co.	c	5601 S. Boyle, Los Angeles	Cantil
Antelope Mud Co.	d	Box 496, Avenal	Rosamond
Bakersfield Rock Co.	d	Box 395, Sta. A, Bakersfield	Bakersfield
Engstrand Elliott, Inc.	d	P.O. Box 132, Rosamond	Rosamond
McKittrick Mud Co., C. C. Sherpenburg	d	McKittrick	McKittrick
Mojave Corp.	d	Box 174, Los Nietos	Frazier Park
Muroc Clay Co.	e	5525 Randolph St., Maywood	Muroc

Los Angeles County			
American Container Co., Inc.	a	3132 E. Pico Blvd., Los Angeles	Los Angeles
Angulo Tile Co., L. R. H. and W. H. Angulo	a c	Reseda, Los Angeles County	Reseda
J. A. Bauer Pottery Co.	a	415 W. Ave. 33, Los Angeles	Los Angeles
J. Booth	a, c	1775 Stanford, Santa Monica	Santa Monica
Builders Brick Co., Ltd.	b	17602 S. Western Ave., Moneta	Moneta and Compton
California Clay Research Co.	d	Box 316, Rosamond	Lancaster
Coast Brick Co.	b	Box 326, Moneta	Torrance
H. F. Coors Co., Inc.	a	Inglewood	Inglewood
Davidson Brick Co.	b	4701 Floral Dr., Los Angeles	Los Angeles
Eljer California Co.	a	4100 Alameda, Los Angeles	Arcadia
Emsco Refractories Co.	a, b	5601 S. Boyle Ave., Vernon	Vernon
Gladding, McBean & Co., Tropico, L. A. & S. M. Plants	a, b, c	2901 Los Feliz Blvd., Los Angeles	Tropico, Los Angeles, Santa Monica, Hermosa Beach and Vernon
Higgins Brick & Tile Works	a, b, c	Box 525, Moneta	Moneta
Italian Terra Cotta Co.	a	1149 Mission Rd., Los Angeles	Los Angeles
Meyers Pottery Co.	a	2318 E. 52d St., Los Angeles	Los Angeles
Pacific Clay Products	a, b, c	Box 145 Sta. A, Los Angeles	Los Angeles and Los Nietos
Pomona Tile Mfg. Co.	a	629 N. La Brea Ave., Los Angeles	Pomona
Refractories Corp.	a, b	3363 Fruitland Rd., Vernon	Vernon
San Vallee Tile Kilns, R. F. Stubver, Mgr.	a, c	6601 Wilbur, Reseda	Reseda
Simons Brick Co., Walter R. Simons	a, b, c	1195 S. Boyle Ave., Los Angeles	Los Angeles
Star Brick Co.	b	Moneta	Moneta
Vernon Potteries	a	2300 E. 52d St., Los Angeles	Vernon
Vitrefrax Co.	a, b, c	5050 Pacific Blvd., Los Angeles	Los Angeles
Marin County			
McNear Brick Co.	a, c	McNear Point, San Rafael	McNear
Orange County			
El Toro Clay Co., I. P. Arnold	c, f	1846 W. 83d St., Los Angeles	El Toro
Gladding, McBean & Co.	c	2901 Los Feliz Blvd., Los Angeles	Gypsum
La Bolsa Tile Co.	a, c	R.F.D. 1, Box 174 Huntington Beach	Smeltzer
Mission Clay Products Co.	a, b, c	Olive	Olive
Tierra Colorado Clay Co.	c	Box 441, San Juan Capistrano	San Juan Capistrano
Placer County			
Clay Corp. of Calif.	c	1275 Harrison St., San Francisco	Lincoln
Gladding, McBean & Co.	a, b, c	2901 Los Feliz Blvd., Los Angeles	Lincoln
Lincoln Clay Products Co.	e	Lincoln	Lincoln
Riverside County			
Alberhill Coal & Clay Co.	c	Box 4267, Village St., Los Angeles	Alberhill
Los Angeles Brick Co.	a, b, c	1078 Mission Rd., Los Angeles	Alberhill
Pacific Clay Products	c	Box 145, Sta. A, Los Angeles	Corona
Temescal Clay Co.	c	8601 Dorothy Ave., South Gate	Temescal

a. Clay products. b. Brick and hollow building tile. c. Crude clay. d. Oil-well drilling-mud. e. Filtering clay. f. Fire sand. g. Gannister.

CLAY—1941—Continued

(Including producers of crude clay; and manufacturers of brick, tile, porcelain, etc.)

Operator	Remarks	Address	Location of plant or pit
Sacramento County			
Cannon & Co.	a, b, c	Box 802, Sacramento	Ben Ali
Gladding Bros. Mfg. Co.	c	S. 3rd and Keyes Sts., San Jose	Folsom
H. C. Muddox, Jessie E. Muddox, Owner	a	30th and L Sts., Sacramento	Sacramento
Panama Pottery Co.	a	R.F.D. 4, Box 1478, 24th St. Rd., Sacramento	Sacramento
Sacramento Brick Co.	b	1300 Front St., Sacramento	Sacramento
San Bernardino County			
Baroid Sales Div., National Lead Co.	d, e	830 Ducommun St., Los Angeles	Hector
Gladding, McBean & Co.	c	2901 Los Feliz Blvd., Los Angeles, Box 421	Hart
Hancock Brick Yard, C. P. Hancock & Son	b	Riverside	Highgrove
Kennedy Minerals Co.	c	2550 E. Olympic Blvd., Los Angeles	Colton
Pacific Bentonite Mine, Louis Martinez	e	Box 374, Red Mountain	Red Mountain
Southern California Minerals Co., W. K. Skeoch	c	320 S. Mission Rd., Los Angeles	Goffs
Temescal Clay Co.	g	6801 Dorothy Ave., South Gate	Hicks
Velvet-White Co., B. N. Murphy	c	Box 389, Burbank	Oro Grande
San Diego County			
Bay View Fuel Co.	c	10983 Colver Ave., Lynwood	San Diego
Pacific Clay Products Co.	c	Box 145, Station A, Los Angeles	Farr Station
Standard Oil Co. of Calif.	e	Standard Oil Bldg., San Francisco	Palm Siding
Union Brick Co., J. W. Rice	b	3565 3d St., North San Diego	Rose Canyon
Vitrified Products Corp.	a, b, c	4570 Pacific Highway, San Diego	North San Diego
San Joaquin County			
Joaquin Potteries	a	McKinley Ave., Stockton	Stockton
Pacific Clay Products Co.	c	Box 145, Station A, Los Angeles	
San Joaquin Brick Co.	b	33 S. El Dorado St., Stockton	Stockton
Stockton Brick & Tile Co.	a, b, c	McKinley Ave. Stockton	Stockton
San Luis Obispo County			
San Luis Brick Works, Faulstick Bros.	b	San Luis Obispo	San Luis Obispo
San Mateo County			
Richmond Potteries, Inc.	a	Box 187, South San Francisco	South San Francisco
Santa Barbara County			
McNall Building Materials	a, b c	208 N. Salsipuedes, Santa Barbara	Santa Barbara

Santa Clara County			
Coyote Creek Clay Bed, L. R. Lenfest	c	400 Woster Ave., San Jose	San Jose
Garden City Pottery	a	560 N. 6th St., San Jose	San Jose
Gladding Bros. Mfg. Co.	a, b, c	S. 3d and Keyes Sts., San Jose	San Jose
Myers Ceramic Pottery, F. Hinz	a	Box 97, Santa Clara	Santa Clara
Remillard-Dandini Co.	b	569 3d St., Oakland	San Jose
Solon & Larkin	a	1881 S. 1st St., San Jose	San Jose
Stanislaus County			
Coopertown Clay Deposit, J. H. Hornsby	c	714 E. Jefferson St., Stockton	Coopertown
Lester Raggio	c	Knights Ferry	Knights Ferry
Sutter County			
Gladding, McBean & Co.	c	2901 Los Feliz Blvd., Los Angeles	Nicolaus
Tulare County			
San Joaquin Materials Co.	b	744 G St., Fresno	Exeter
Ventura County			
Shell Oil Co., Dent Clay Pit	d	Shell Bldg., San Francisco	Ventura

a. Clay products. b. Brick and hollow building tile. c. Crude clay. d. Oil-well drilling-mud. e. Filtering clay. f. Fire sand. g. Gannister.

COAL

Operator	Address	Location of mine
Amador County		
Buena Vista Coal Mine, G. E. Morrison	518 55th St., Oakland	Ione

COPPER

(Principal Copper Producers in California in 1942—not less than 10,000 pounds)

Mine	Operator	Address	Locality of mine
Calaveras County			
Keystone (Calaveras Copper)	Keystone Copper Company	Copperopolis	Copperopolis
Inyo County			
Columbia No. 2	Shoshone Mines, Inc.	Tecopa	Tecopa
Pine Creek	U. S. Vanadium Corp.	30 E. 42d St. New York, N. Y.	Bishop
Madera County			
Daulton	West Coast Production Co.	450 Jessie St., San Francisco	Raymond
Mariposa County			
Barrett	R. E. Nolander	Merced Falls	Hornitos
Nevada County			
Lava Cap	Lava Cap Gold Mining Corp.	Box 780, Nevada City	Nevada City
San Bernardino County			
Bagdad-Chase	Frank Royer	Red Mountain	Ludlow
Rio Vista (Ord Mountain)	H. J. Stevenson	Security Bldg., Los Angeles	Barstow
Santa Barbara County			
Tunnel	Antolini & Johnson	131 E. Gutierre St., Santa Barbara	Santa Barbara
Shasta County			
Iron Mountain	The Mountain Copper Co., Ltd.	216 Pine St., San Francisco	Matheson

DIATOMITE (DIATOMACEOUS EARTH)

Operator	Address	Location of quarry or mine
Los Angeles County		
The Dicalite Co.	756 S. Broadway, Los Angeles	San Pedro
Monterey County		
Pacatome, Inc.	Bradley	Bradley
Santa Barbara County		
Johns-Manville Products Corp.	Lompoc	Lompoc
Lompoc Diatomite Co.	405 Montgomery St., San Francisco	Lompoc

DOLOMITE

Operator	Address	Location of quarry
Inyo County		
Inyo Marble Co.	726-732 E. 29th St., Los Angeles	Keeler
Los Angeles County		
W. F. Glasser, Inc.	713 N. Sepulveda, Brentwood Heights, Los Angeles	Bel-Air
Monterey County		
Bethlehem Steel Co., Sterling Ranch Quarry	20th and Illinois, San Francisco	Natividad
Permanente Metals Corp.	Permanente	Natividad
Riverside County		
Miller Bros. Trucking Co.	10424 Washington Ave., South Gate	Glenhaven
San Benito County		
Archie E. Hamilton	Hollister	Hollister
Tuolumne County		
U. S. Limestone Products Corp.*	85 2d St., San Francisco	Sonora

*Output partly used in lime.

FELDSPAR

Operator	Address	Location of mine
Fresno County		
W. H. Childer	Box 671, Fresno	Friant
San Bernardino County		
Gladding, McBean & Co.	2901 Los Feliz Blvd., Los Angeles	
San Diego County		
American Radiator & Standard Sanitary Corp., D. D. Fleming, Mgr.	Campo	Campo

GEMS AND JEWELERS' MATERIALS

Operator	Variety	Address
W. C. Eyles	Californite, moss agate	749 W. A St., Hayward
Wm. Grove	Iceland-spar	Cedarville
H. F. Heather	Iceland-spar	236 Oak Knoll Ave., Pasadena

GOLD

Principal gold producers in California out of a total of 1,866 placer operators and lode mines in 1940

Mine	Type of mine	Operator	Address	Postoffice of mine
Alpine County				
Zaca	a	Steve Rastelli and Steve Maffi	826 Humboldt, Reno, Nev.	Markleeville
Amador County				
Arata-Van Sandt property	e	Gold Hill Dredging Co.	311 California St., San Francisco	Camanche
Argonaut	a	Argonaut Mining Co., Ltd.	Jackson	Jackson
Arroyo Seco	h	Arroyo Seco Gold Dredging Co.	351 California St., San Francisco	Ione
Arroyo Seco Ranch	h	San Andreas Gold Dredging Co.	960 Russ Bldg., San Francisco	San Andreas
Belden	a	Belama Corp.	Pine Grove	Pine Grove
Buena Vista	e	Lancha Plana Gold Dredging Co.	Camanche	Camanche
Central Eureka and Old Eureka	a	Central Eureka Mining Co.	Sutter Creek	Sutter Creek
Delta Tailings	c	Delta Tailings Co.	564 Market St., San Francisco	Ione
Garibaldi	k	Garibaldi Bros.	Volcano	Volcano
Horseshoe Dredge	h	Horseshoe Dredging Co.	Ione	Ione
Horton	g	H. G. Kreth	Route 1, Box 67, Ione	Ione
Italian	a	Black Hills Mining Co.	Jamestown	Drytown
Kennedy	a	Kennedy Mining & Mlng Co.	519 California St., San Francisco	Martell
Kent Dredge	h	E. A. Kent	351 California St., San Francisco	Sutter Creek
Keystone	a	Keystone Mine Syndicate	Amador City	Amador City
Ernest L. Lilly Dredge*	h	Ernest L. Lilly	706 California Bldg., Stockton	Ione
John McCulloh Property	k	Pacific Placers Engineering Co.	Valley Springs	Valley Springs
Pioneer	a	Gwalia Gold Mining Co.	Pine Grove	Pine Grove
Placeritas Dredge*	h	Placeritas Mining Co.	245 N. Gramercy Pl., Los Angeles	Plymouth
Plymouth Tails	c	Argonaut Mining Co., Ltd.	Jackson	Plymouth
Rim Cam Dredge*	h	Rim Cam Gold Dredging Co.	Ione	Ione
River Pine	h	River Pine Mining Co.	2432 19th Ave., San Francisco	Plymouth
Rupley Ranch	k	John C. Pantle	Plymouth	Plymouth
Butte County				
Butte Operating Co. property	h	Butte Operating Co.	Oroville	Oroville
Butte Unit Yuba Cons. Dredge	e	Yuba Cons. Gold Fields	351 California St., San Francisco	Hammonton
Farnan Ranch	h	Baker & McCowan	Palermo	Palermo
Feather River Dredge	h	Golden Feather Dredging Co.	817-25th St., Sacramento	Oroville
Gianella Ranch	h	Interstate Mines, Inc.	Box 498, Chico	Palermo
L. L. Kister property	h	Humphreys Gold Corp.	910 First National Bank Bldg., Denver, Colo.	Sloughhouse
Lemroh	h	Lemroh Mining Co.	2401 Bayshore Blvd., San Francisco	
Little Butte	a	Dr. D. W. Babcock	Empire Bldg., Placerville	Magalia
Peters Ranch	h	Lord & Bishop	Box 812, Sacramento	Oroville
Piombo Bros. Dredge	h	Piombo Bros. & Co.	1571 Turk St., San Francisco	Oroville
Placer Development Co. property	h	Placer Development Co.	2401 Bayshore Blvd., San Francisco	Oroville

* Dredging operators on two or more properties combined.

a. Lode gold mine. b. Gold-Silver mine. c. Tailings dumps. d. Pocket. e. Dredge (bucket line). f. Drift mine. g. Hydraulic mine. h. Dragline operations. j. Copper-Gold mine. k. Power shovel or dry land dredge. m. Lead mine.

GOLD—Continued

Principal gold producers in California out of a total of 1,866 placer operators and lode mines in 1940

Mine	Type of mine	Operator	Address	Postoffice of mine
Butte County—Continued				
William Richter & Sons Dredge*	h	William Richter & Sons	Oroville	Oroville
Surcease	a	Hoefling Bros.	Box 786, Sacramento	Oroville
Weymans Ravine	h	Sunmar Dredging Co.	Box 228, Oroville	Oroville
Wilton Kister property	c	Gold Hill Dredging Co.	311 California St., San Francisco	Oroville
Calaveras County				
Big Springs	a	C. E. Gruwell	Angels Camp	Angels Camp
Carson Hill	a	Carson Hill Gold Mining Corp.	Melones	Melones
Cat Camp	g	J. E. Biallas	Valley Springs	Valley Springs
Comet	a	Comet Quartz Mine, Inc., and lessees	San Andreas	San Andreas
Cooks	k	Midas Placer Co.	Camanche	Camanche
Easy Bird	a	Le Roi Mines, Inc.	Jackson	Jackson
Genochio	h	James H. Henry	740 W. Willow St., Stockton	San Andreas
Glo-Bar	f	Glo-Bar Mines	370 E. 37th St., Long Beach	San Andreas
C. F. Hogate Ranch	h	C. E. Gruwell	Angels Camp	Angels Camp
Lancha Plana Dredge No. 2	e	Lancha Plana Gold Dredging Co.	Camanche	Camanche
Mehrten Bros. Dredge	k	L. C. and Charles Mehrten, Jr.	Box 143, Camanche	Camanche
Mountain King	a	Jumbo Cons. Mining Co.	425 Title Ins. Bldg., Los Angeles	Copperopolis
Pine Log	a	Will Halloran	Milton	Milton
R and M Dredge	h	R and M Mining Co.	La Porte	Douglas Flat
Red Hill	k	Young & Son Co., Ltd.	Mokelumne Hill	Mokelumne Hill
Royal	a	Frank S. Tower	Milton	Milton
Ryno property	k	Pacific Placers Engineering Co.	Valley Springs	Valley Springs
San Andreas Dredge*	h	San Andreas Gold Dredging Co.	960 Russ Bldg., San Francisco	San Andreas
Sheep Ranch	a	St. Joseph Lead Co.	Sheepranch	Sheepranch
Stagan Dredge	h	Stagan Mining Co.	1440 N. Hunter St., Stockton	Jenny Lind
Stockton Gregory property	h	W. C. Thompson	Box 77, Linden	Linden
Stockton Reservoir	h	Lord & Bishop	Box 812, Sacramento	Stockton
Vallecito Western	f	Vallecito Mining Corp.	Murphys	Angels Camp
Wolhall	h	Wolhall Dredging Corp.	Natoma	San Andreas
El Dorado County				
Alhambra-Shumway	a	Alhambra-Shumway Mines, Inc.	Kelsey	Kelsey
Arroyo Mining Co., Lease	h	Greenhorn Dredging Co.	Youngs	Youngs
Briarcliffe	a	Briarcliffe Mines, Ltd.	Box 166, Plymouth	Plymouth
Carson Creek	h	McQueen & Downing	Weaverville	Kelsey
Cosumnes	a	Cosumnes Mines, Inc.	Grizzly Flat	Grizzly Flat
D. G. Davenport property	k	Irish Creek Mining Co.	Georgetown	Georgetown
Dunlap Ranch	h	Big Canyon Dredging Co.	Box 656, Fresno	Folsom
El Dorado Crystal	a	El Dorado Crystal Mine	Shingle Springs	Shingle Springs
El Dorado Dredge*	h	El Dorado Dredging Corp.	Greenwood	Greenwood
Greenwood	a	John Van Daam	156 Montgomery St., San Francisco	Greenwood
Frank Kipp property	h	Horseshoe Dredging Co.	Youngs	Youngs

Lemroh Dredge	h	Lemroh Mining Co.	2401 Bayshore Blvd., San Francisco	
Morgan	k	Irish Creek Mining Co.	Georgetown	Georgetown
Operation No. 2	h	General Dredging Corp.	Natoma	Lotus
Sliger	a	Middle Fork Gold Mining Co.	Auburn	Auburn
Fresno County				
Friant Dam aggregate deposit	k	Griffith Co. & Bent Co.	Friant Dam	Friant
Humboldt County				
Pearch	g	Fred Delaney and Roy McGain	Orleans	Orleans
Imperial County				
Cargo Muchacho group	a	Homes & Nicholson Mining & Mlng Co.	Box 828, Yuma, Ariz.	Ogilby
Mary Lode	a	Mary Lode Mines	Drawer 422, El Centro	Glamis
Queen	a	Thomas L. Woodruff	Ogilby	Ogilby
Sovereign	a	Sovereign Development Co.	Ogilby	Ogilby
Inyo County				
Big Bell	a	K. M. Woods	Box 124, Beatty, Nev.	Beatty, Nev.
Columbia No. 2	m	Shoshone Mines, Inc.	Tecopa	Tecopa
Del Norte-Skidoo	a	Del Norte Mining Co. and lessees	Mojave	Trona
Margaret	a	Don H. Clair	Box 51, Trona	Trona
Reward (Brown Monster)	a	Basil Prescott et al.	Lone Pine	Independence
Ruth	a	Burton Bros.	Rosamond	Trona
Kern County				
Big Blue and Lady Belle	a	Kern Mines, Inc.	Kernville	Kernville
Black Hawk	a	Ernest Stevens et al.	Randsburg	Randsburg
Bobtail	a	W. L. Dietz	Mojave	Mojave
Butte Lode	a	Butte Lode Mining Co.	650 S. Grand Ave., Los Angeles	Randsburg
Cactus Queen	b	Cactus Mines Co.	Rosamond	Rosamond
Desert Queen	a	Morris Albertoli	Box 2028, Mojave	Mojave
Four Jacks	a	Eric Fallen et al.	Mojave	Mojave
G. B. and Boston No. 2 Claims	a	Wegman, Movold and Wegman	Box 43, Red Mountain	Red Mountain
Gold Bug	a	Tony De Mayo et al.	Randsburg	Randsburg
Golden Queen	a	Golden Queen Mining Co.	Mojave	Mojave
Lodestar	a	Lodestar Mining Co.	Mojave	Mojave
King Solomon	a	King Solomon Mines Lease	Johannesburg	Randsburg
Lone Star	a	Mattie Moreland	Bodfish	Bodfish
Lucky Boy	a	T. B. Peterson	Box 186, Randsburg	Randsburg
Standard	a	B. F. Forbes and lessees	Mojave	Mojave
Tropico	a	Burton Bros. and lessees	Mojave	Mojave
Wade	a	Glen Hatton et al.	Box 345, Red Mountain	Red Mountain
White	a	F. E. Edwards et al.	Red Mountain	Red Mountain
Yellow Aster	c	Anglo American Mining Corp., Ltd.	Randsburg	Randsburg
Yellow Dog	a	Jack Holt et al.	Mojave	Mojave
Yellow Rover	a	A. J. Bruce et al.	Mojave	Mojave

* Dredging operations on two or more properties combined.
a. Lode gold mine. b. Gold-Silver mine. c. Tailings dumps. d. Pocket. e. Dredge (bucket line). f. Drift mine. g. Hydraulic mine. h. Dragline operations. j. Copper-Gold mine. k. Power shovel or dry land dredge. m. Lead mine.

GOLD—Continued

Principal gold producers in California out of a total of 1,866 placer operators and lode mines in 1940

Mine	Type of mine	Operator	Address	Postoffice of mine
Los Angeles County				
Governor	a	Governor Mine Co.	725 S. Figueroa St., Los Angeles	Acton
Mariposa County				
Baker Dredge	h	Barker Corp.	Hornitos	Hornitos
Bondurant	a	Bondurant Mining & Mlng. Co.	405 Montgomery St., San Francisco	Coulterville
Chase Ranch	h	Trebor Corp.	Box 51, Mariposa	Mariposa
Ferguson	a	San Juan Ramsey Co.	Box 30, Incline	Incline
Granite King	a	Buckeye Mining Co.	Mariposa	Mariposa
Hauser	a	W. H. Hauser	3028 E. 17th St., Oakland	
Malvina	a	Boston Calif. Mining Co.	Sonora	Coulterville
Mount Gaines	a	Mount Gaines Mining Co.	Hornitos	Hornitos
Nutmeg	a	John F. Zak	4317 T St., Sacramento	Mariposa
Pine Tree and Josephine	a	Pacific Mining Co.	1022 Crocker Bldg., San Francisco	Bear Valley
Pittsburg	a	L. E. Walbridge	Mt. Bullion	Mt. Bullion
Schroeder	a	Schroeder, Odgers and Sohroeder	Midpines	Midpines
Merced County				
P. H. Bottoms Dredge	h	P. H. Bottoms	Box 121, Merced Falls	Snelling
Merced Dredge No. 1	e	Merced Dredging Co.	Mills Tower, San Francisco	La Grange
Merced Unit	e	Yuba Cons. Gold Fields	351 California St., San Francisco	Snelling
Robinson Bros. property	h	Gibson Mining Co.	Route 2, Box 17, Oroville	Snelling
San Joaquin Dredge No. 1	e	San Joaquin Mining Co.	1805 Mills Tower, San Francisco	La Grange
Snelling Dredges Nos. 1 and 2	e	Snelling Gold Dredging Co.	Snelling	Snelling
Mono County				
Gold Crown	a	Robert G. Jones	Benton	Benton
Log Cabin	a	Log Cabin Mines Co.	Leevining	Leevining
Monte Christo	a	Monte Christo Mining Co.	Box 134, Whittier	Mammoth Lakes
Standard	a	Roseklip Mines Co.	206 Sansome St., San Francisco	Bodie
Napa County				
Grigsby (Palisades)	b	Graham Loftus Oil Corp.	811 W. 7th St., Los Angeles	Calistoga
Nevada County				
Arctic	a	Kemmerer Exploration Co.	Eureka, Utah	Washington
Bullion	a	Grass Valley Bullion Mines	Russ Bldg., San Francisco	Grass Valley
Champion Flat	h	Dakins Co.	917 Sacramento St., San Francisco	Nevada City
Coleburn property	h	Pilot Dredging Co.	Cottonwood	Nevada City
Empire Star Group	a	Empire Star Mines Co., Ltd.	14 Wall St., New York, N. Y.	Grass Valley
Golden Center	a	Cooley Butler	745 Rowan Bldg., Los Angeles	Grass Valley
Green Mountain	a	James Kistle	Nevada City	Nevada City
Idaho Maryland	a	Idaho Maryland Mines Corp.	Box 1028, Grass Valley	Grass Valley
Lava Cap	a	Lava Cap Gold Mining Corp.	Box 780, Nevada City	Nevada City

North Star Tails	c	Charles Lintecum	223 N. Auburn St., Grass Valley	Grass Valley
Parker Ranch	k	Kaufield & McKinley	Lincoln	North Bloomfield
Scott Flat Creek property	h	William Richter	Oroville	Scotts Flat
Spanish	a	Bradley Mining Co.	425 Crocker Bldg., San Francisco	Washington
Trood	k	William Von Der Hellen	Box 158, Yreka	Nevada City
Wyandotte Dredge*	h	Wyandotte Dredging Co.	Box 228, Nevada City	Nevada City
Placer County				
Ahart Ranch	k	Pantle Bros.	Lincoln	Lincoln
Alabama	a	Alabama Gold Mines Co.	Auburn	Auburn
Harold A. Best Dredge*	k	Harold A. Best	Lincoln	Lincoln
Duncan Hill	a	Duncan Hill Cons.	Auburn	Auburn
Eclipse	a	Ophir Nevada Mining & Mlng. Co.	Auburn	Auburn
El Oro Dredge*	h	El Oro Dredging Co.	Colfax	Colfax
Gaylord-Laville	f	J. A. Conners	Box 788, Auburn	Auburn
Gladding Ranch	h	Aalders and Prather	Lincoln	Lincoln
Guilford Ranch	h	Fay Placer Mines Co.	Lincoln	Lincoln
Hallstrom and Lindblad Dredge*	k	Hallstrom and Lindblad	Route 7, Box 4343A, Sacramento	Loomis
Highway Forty	a	Highway Forty Mines, Inc.	1235 42d St., Sacramento	Auburn
Innis Dredge	h	Innis Dredging Co.	Nevada City	Nevada City
Lost Camp	g	Lost Camp Mining Co.	Blue Canon	Blue Canon
Love Ranch	k	Kaufield and McKinley	Box 274, Lincoln	Loomis
Midland Dredge	h	Midland Company	Box 8, Sawyers Bar	Lincoln
Minnie Thaveneut Ranch	k	Sills Bros.	Auburn	Auburn
Oro Fino	a	Oro Fino Cons. Mines	Box 432, Auburn	Auburn
Panob Dredge*	k	Panob Gold Dredging Co.	Box 896, Lincoln	Lincoln
Rawhide	a	Canyon Mines Corp.	Baxter	Baxter
Recalp	h	Jasper-Stacy Co.	Lincoln	Lincoln
Rizzi	k	Charles M. Chittenden	Lincoln	Lincoln
Ruck-a-Chucky Dam Site	a	O. D. Johnson et al.	Auburn	Auburn
Scouler	k	W. K. Potts	Auburn	Auburn
Strap Ravine	e	Roseville Gold Dredging Co.	351 California St., San Francisco	Roseville
Volcano	f	Volcano Mining Co., Ltd.	1018 Mills Bldg., San Francisco	Foresthill
Yamada	k	R. O. Bohnett	Box 454, Loomis	Loomis
Plumas County				
Cherokee	a	Cherokee Mine	200 Bush St., San Francisco	Greenville
Imperial	a	Gerald R. Simpson	Box 957, Quincy	Quincy
Innis Dredge	h	Innis Dredging Co.	Nevada City	Greenville
Jamison	a	Sierra Manzanita Mining Co. et al.	Blairsden	Blairsden
Meadow Valley	h	Baker and McCowan	Box 305, Chico	Meadow Valley
Ohio Point	a	Virgilia Mining Corp.	Virgilia	Virgilia
Standart	a	Indian Valley Mining Co., Inc.	Greenville	Johnsville
Walker	j	Walker Mining Co.	821 Kearns Bldg., Salt Lake City, Utah	Walkermine
Riverside County				
Black Eagle	m	Imperial Smelting & Ref. Co.	Box 1096, Indio	Indio
Standard	a	Joe Geiger and Willard H. Allen	Twenty-nine Palms	Twenty-nine Palms
Water Well	a	Mission Mining Corp., Ltd.	Box 611, Mecca	Mecca

* Dredging operations on two or more properties combined.

a. Lode gold mine. b. Gold-Silver mine. c. Tailings dumps. d. Pocket. e. Dredge (bucket line). f. Drift mine. g. Hydraulic mine. h. Dragline operations. j. Copper-Gold mine. k. Power shovel or dry land dredge. m. Lead mine.

GOLD—Continued

Principal gold producers in California out of a total of 1,866 placer operators and lode mines in 1940

Mine	Type of mine	Operator	Address	Postoffice of mine
Sacramento County				
Capital Dredge	e	Capital Dredging Co.	351 California St., San Francisco	Folsom
Cosumnes Dredge	e	Cosumnes Gold Dredging Co.	351 California St., San Francisco	Sloughhouse
Fassett-Parker Hanlon	h	Humphreys Gold Corp.	910 First National Bank Bldg., Denver, Colo.	Sloughhouse
General Dredge No. 1	h	General Dredging Corp.	505 Bank of America Bldg., Sacramento	Natoma
Hoosier Gulch Dredge*	h & k	Hoosier Gulch Placers	817 25th St., Sacramento	Sacramento
Hoxsie	k	H. W. McKinley	Star Route, Box 13, Folsom	Folsom
Lancha Plana Dredge No. 4	e	Lancha Plana Gold Dredging Co.	Camanche	Cosumnes
Martin Quinn Estate	h	Carson Creek Dredging Co.	216 Pine St., San Francisco	Folsom
McQueen and Downing Dredge	h	McQueen and Downing	Weaverville	Folsom
Natomas	e	Natomas Company	Box 1197, Sacramento	Natoma
Prairie City	k	Kutil Gold Dredge	Box 191, Folsom	Folsom
John Vincent property	h	Climax Dredging Co.	Box 21, Roseville	Roseville
San Bernardino County				
Bagdad-Chase	a	Frank W. Royer	Red Mountain	Ludlow
Carlyle	a	Camco Mining Co.	Twenty-nine Palms	Twenty-nine Palms
Gold Crown	a	Gold Crown Mining Co.	Twenty-nine Palms	Twenty-nine Palms
Gold Stone	a	Leroy A. Wilson	2506 W. 15th St., Los Angeles	Twenty-nine Palms
Holcomb Valley Placer	k	Holcomb Valley Placer Co.	973 N. Main St., Los Angeles	Big Bear Lake
Kelly	a	Frank W. Royer et al.	Red Mountain	Red Mountain
Santa Fe (Arlington)	a	Santa Fe Gold Mines, Inc. and Mines, Inc.	Lucerne Valley	Victorville
Telegraph	a	C. F. Robbins et al.	Barstow	Baker
Valley View	a	W. W. Hartman	1230 E. 109th St., Los Angeles	Ivanpah
----------	a	H. J. Jackson	Box 93, Ludlow	Ludlow
San Joaquin County				
California Gold Dredge	e	California Gold Dredging Co.	351 California St., San Francisco	Camanche
Jennie Lucas and E. A. Putnam property	e	Gold Hill Dredging Co.	311 California St., San Francisco	Clements
McGurk property	h	C. E. Gruwell and San Gruco Co.	Angels Camp	Belota
Watkins Dredge	h	A. G. Watkins and Sons	Linden	Linden
Shasta County				
Blue Gravel	a	August Carino	Box 571, Redding	Redding
Champion Gulch	h	J. P. Brennan	1343 Butte St., Redding	Redding
China Gulch	h	Roy S. Olson	Redding	Redding
Clear Creek Dredge	h	Clear Creek Dredging Co.	Redding	Redding
Crow Creek Dredge	h	Crow Creek Dredging Co.	Box 558, Redding	Redding
Daly Gulch	h	R. S. Olson	Redding	Redding
French Gulch Placer	e	French Gulch Dredging Co.	2404 Russ Bldg., San Francisco	French Gulch
Greenhorn	a	Willow Creek Mines, Inc.	Redding	French Gulch
Happy Valley	h	San Gruco Co.	217 Bank of America Bldg., Beverly Hills	Igo
Iron Mountain	a	The Mountain Copper Co., Ltd.	351 California St., San Francisco	Matteson

Kutras Tract	k	Columbia Construction Co., Inc.	Redding	Redding
Lost Channel	h	J. P. Brennan	1343 Butte St., Redding	Redding
Montezuma	a	Niagara Summit Mining Co.	1607 Market St., San Francisco	French Gulch
Philadelphia and Roosevelt	a	A. P. Robillard	465 California St., San Francisco	French Gulch
Pioneer Dredge	h	Pioneer Dredging Co.	Box 305, Redding	Redding
Thurman Dredge	e	Thurman Gold Dredging Co.	Redding	Redding
Walker	a	Walker Mine Cons.	Box 983, Redding	Redding
Washington	a	J. H. Scott Co.	465 California St., San Francisco	French Gulch
Sierra County				
Bowman	a	W. C. Ennis and Carl L. Johnson	North San Juan	Alleghany
Colombo	a	R. D. Compton	Calpine	Sierra City
Depot Hill	g	F. J. Joubert	Camptonville	Camptonville
Loftus Blue Lead	g	Loftus Blue Lead Mines Co.	801 Columbia St., South Pasadena	La Porte
Oriental	a	Dickey Exploration Co.	Alleghany	Alleghany
Original Sixteen to One	a	Original Sixteen to One Mine, Inc.	1611 Russ Bldg., San Francisco	Alleghany
Plumbago	a	Allied Mines, Inc.	Alleghany	Alleghany
Poverty Hill	g	A. J. Oyster	650 Russ Bldg., San Francisco	La Porte
Siskiyou County				
Buzzard Hill	a	Merriam Mining Merger	Box 68, Happy Camp	Happy Camp
Cal Oro	e	Cal Oro Dredging Co.	681 Market St., San Francisco	Yreka
Etna Gold Dredge	e	Etna Gold Dredging Co.	1730 Franklin St., Oakland	Callahan
Happy Camp Dredge	h	Happy Camp Dredging Co.	Happy Camp	Happy Camp
Hayden	k	Okoro Mines, Inc.	Callahan	Callahan
Humbug Creek	h	Von der Hillen and Webber	Box 217, Yreka	Yreka
Joubert	g	H. J. Dickinson	Sawyers Bar	Sawyers Bar
Judge	g	E. Oberg	Sawyers Bar	Sawyers Bar
Kangaroo	h	Oro Trinity Gold Dredging Co.	Box 212, Oroville	Callahan
King Solomon	a	King Solomon Mines Co.	Monte Vista, Colo.	Black Bear
Klamath River	h	William Van der Hellen Mining Co.	Box 158, Yreka	Yreka
Know Nothing No. 1	g	Clarence Young & Co.	Forks of Salmon	Forks of Salmon
Larson & Harms Dredge*	h	Larsen and Harms	Route 4, Box 2220, Sacramento	Horse Creek
Oro Grande (McKeen)	a	Oils Incorporated of Calif.	405 Montgomery St., San Francisco	Callahan
Sacchi-Spellenberg	h	Sacchi-Spellenberg Mines	Arcata	Forks of Salmon
Siskiyou Unit	e	Yuba Cons. Gold Fields	351 California St., San Francisco	Callahan
Quartz Hill	a	George Noonan	Scott Bar	Scott Bar
Shroeder	a	Schroeder Mining & Development Co.	110 S. Broadway, Yreka	Yreka
Yreka Dredge	e	Yreka Gold Dredging Co.	351 California St., San Francisco	Yreka
Stanislaus County				
C and E Dredge	h	C and E Dredging Co.	1002 Pacific Bldg., Portland, Ore.	Oakdale
Calif. Gold Dredge	e	Calif. Gold Dredging Co.	351 California St., San Francisco	Linden
La Grange Dredge No. 4	e	La Grange Gold Dredging Co.	1805 Mills Bldg., San Francisco	La Grange
Placer Properties	h	Placer Properties, Inc.	Box 532, Oakdale	Oakdale
Triboli & Sophy property	h	G & S Dredging Co.	Chowchilla	Chowchilla
Tuolumne Gold Dredge	e	Tuolumne Gold Dredging Corp.	1 Montgomery St., San Francisco	La Grange

* Dredging operations on two or more properties combined.

a. Lode gold mine. b. Gold-Silver mine. c. Tailings dumps. d. Pocket. e. Dredge (bucket line). f. Drift mine. g. Hydraulic mine. h. Dragline operations. j. Copper-Gold mine. k. Power shovel or dry land dredge. m. Lead mine.

GOLD—Continued

Principal gold producers in California out of a total of 1,866 placer operators and lode mines in 1940

Mine	Type of mine	Operator	Address	Postoffice of mine
Trinity County				
Arbuckle	g	Arbuckle Bros.	Weaverville	Weaverville
B. H. K.	h	B. H. K. Mines	Orland	Weaverville
Canyon Placers	g	C. H. Bergin	Junction City	Junction City
Carrville Dredge	e	Carrville Gold Co.	807 Lonsdale Bldg., Duluth, Minn.	Trinity Center
Dawn	g	Dawn Mining Co.	Weaverville	Weaverville
Filibuster group	h	Viking Dredging Co.	Box 498, Chico	Douglas City
Hayfork Unit	h	Cinco Mineros Co.	Box 212, Oroville	Hayfork
Junction City	e	Junction City Mining Co.	685 6th St., San Francisco	Junction City
La Grange	g	La Grange Placer Mines, Ltd.	Weaverville	Weaverville
Lincoln Gold Dredge*	h	Lincoln Gold Dredging Co.	Lincoln	Lewiston
Lowden Ranch	h	Interstate Mines, Inc.	Box 14, Weaverville	Weaverville
Red Hill	h and g	Goldfield Cons. Mines Co.	1225 Crocker Bldg., San Francisco	Junction City
Slate Bar	g	Cal-Tex Mining Co.	Weaverville	Douglas City
Swanson	g	Swanson Mining Corp.	Salyer	Salyer
Trinity Dredge	e	C. R. and T. D. Harris	Lewiston	Lewiston
Weaver Dredge*	h	Weaver Dredging Co.	Box 216, Weaverville	Weaverville
Weaverville Unit	h	Oro Trinity Dredging Co.	Box 212, Oroville	Weaverville
Tuolumne County				
Chinese Camp Unit	h	Baker Corp.	Hornitos	Chinese Camp
Densmore	a	Densmore Gold Mines, Inc.	Columbia	Columbia
Eagle-Shawmut	a	Miller and Clemson	4800 Santa Fe Ave., Los Angeles	Chinese Camp
Heslep-App-Sweeney	a	Allied Mines, Inc.	Jamestown	Jamestown
Hidden Treasure	a	Harry Gibson et al.	Columbia	Columbia
Jackass (Dredge No. 2)	h	L. R. Harris	Merced	
Juniper	a	Lobicasa Company	Box 812, Sacramento	Jamestown
Kent Dredges No. 1 and No. 2	h	E. A. Kent	Box 391, Stockton	Jamestown
La Bienvenita	k	E. Z. Bowman	Box 6, Chinese Camp	Chinese Camp
La Guria	a	La Guria Gold Mining Co.	515 Fidelity Bldg., Los Angeles	Groveland
McCormick Ranch	h	Mullin and Company	Sonora	Sonora
Razzano and Lawrence Dredge	k	George Razzano	Chinese Camp	Chinese Camp
Ryan	a	Ryan Mining Co.	Twain Harte	Sonora
Sleepy Hollow	d	R. H. Hallock	Sonora	Sonora
Stockton	d	J. A. McMahon	2001 California St., San Francisco	Sonora
Yuba County				
Archimedes property	e	Williams Bar Dredging Co.	Box 575, Marysville	Smartville
Big Ravine	h	Parks Bar Co.	Box 932, Nevada City	Smartville
Far West Dredge	h	Far West Dredging Co.	Wheatland	Wheatland
Parks Bar	k	Arundel Corp.	Box 951, Marysville	Smartville
Pennsylvania	a	Empire Star Mines Co., Ltd.	14 Wall St., New York, N. Y.	Brown Valley
Princess Pine	h	R & M Mining Co.	La Porte	Strawberry Valley
Sunmar Dredge*	h	Sunmar Dredging Co.	Box 228, Oroville	Smartville
Yuba Unit	e	Yuba Cons. Gold Fields	351 California St., San Francisco	Hammonton

* Dredging operations on two or more properties combined.

GRANITE

Operator	Product	Address	Location of quarry
Fresno County			
Superior-Academy Granite Co.	a	Clovis	Academy
Lassen County			
Greig Quarry, A. D. Greig	a	Susanville	Susanville
Madera County			
Madera Quarries Co.	a	Box 156, Madera	Bates Station
Placer County			
Union Granite Co., Ruhkala Bros.	a	Rocklin	Rocklin
Victor Wickman	a	Rocklin	Rocklin
Riverside County			
Emil Johnson	a	Perris	Perris
Sacramento County			
Folsom State Prison	a, e	Represa	Represa
San Bernardino County			
Texas Quarries, Inc., R. M. Richter	a	Box 605, Victorville	Victorville
San Diego County			
Crystal Black Quarry, John Stridsburg	a	Escondido	Spooks Canyon
Sonoma County			
S. Cabrol	b, c	Glen Ellen	Glen Ellen
Ventura County			
W. G. Dryden	c	Fillmore	Grimes Canyon

a. Granite used in building and monumental stone. b. Tuff used as building stone. c. Volcanic rock used as flagstone and building stone. d. Mica schist used as building stone. e. Paving blocks.

GYPSUM

Operator	Address	Location of quarry
Alameda County		
Westvaco Chlorine Prod. Corp.*	Newark	Newark
Imperial County		
Imperial Gypsum Quarry, Pacific Portland Cement	417 Montgomery St., San Francisco	Plaster City
Kern County		
Handel & Son	Shafter	Lost Hills
H. M. Holloway	Box 310, Lost Hills	Lost Hills
Theta Gypsum Co.	Lost Hills	Lost Hills
Valley Agricultural Gypsum Co.	Box 186, Shafter	Belridge
Western Gypsum Co.	Box 846, McKittrick	McKittrick
Monterey County		
Triangle Fertilizer Co.	Salinas	King City
Riverside County		
U. S. Gypsum Co.	507 Architects Bldg., Los Angeles	Midland
Ventura County		
A. H. Lange**	Box 194, Tehachapi	Cuyana Valley
Monolith Portland Cement Co.	Bartlett Bldg., Los Angeles	Cuyana Valley

* Output not included in production figures as gypsum is by-product of chemical process using minerals already included in State total.
** Sold to Monolith Portland Cement Co. in March 1942.

IODINE

Operator	Address	Mine
Los Angeles County		
Deepwater Chemical Co., Ltd.	Box 588, Compton	Compton
The Dow Chemical Co.	Midland, Mich.	Long Beach and Venice

IRON

Operator	Address	Location of mine
Inyo County		
L. E. Netherton	Red Mountain	Inyokern
San Bernardino County		
Altuda Mining Co.	725 S. Freemont Ave., Alhambra	Hodge
Kaiser Co., Inc., Iron and Steel Division	515 Latham Square Bldg., Oakland	Kelso
Minerals Material Co.	1145 Westminster Ave., Alhambra	Baxter
Shasta County		
Shasta Iron, Carrico & Bautier	365 Ocean Ave., San Francisco	Heroult
Trinity County		
F. B. Cayot	Golden Eagle Hotel, Redding	

LEAD

Principal lead producers in California in 1942. (Not less than 10,000 pounds.)

Mine	Operator	Address	Post office of mine
Inyo County			
Columbia No. 2	Shoshone Mines, Inc.	Tecopa	Tecopa
Colorado	Combined Metals Reduction Co.	Box 84A, Lone Pine	Panamint Springs
Defence	C. C. King	Keeler	Panamint Springs
Essex-Columbia (Darwin Lead)	Imperial Metals, Inc.	Darwin	Darwin
Gold Bottom	L. E. Damon	Trona	Trona
Honolulu	Southwest Lead & Zinc Co.	433 S. Spring St., Los Angeles	Trona
Last Chance	L. D. Foreman	Keeler	Keeler
Leary	Desert Miners	Lone Pine	Keeler
Ophir	C. O. Mittendorf	Trona	Trona
Mariposa County			
Malvina	Boston California Mining Co.	Sonora	Coulterville
Nevada County			
Lava Cap	Lava Cap Gold Mining Co.	Box 780, Nevada City	Grass Valley
Placer County			
Alabama	Alabama California Gold Mines Co.	Box 488, Auburn	Penryn
San Bernardino County			
Carbonate King	W. F. Huston	Mountain Pass via Nipton	Nipton
Iron Horse	F. C. Fritz	Nipton	Baker
Sagamore (Alpha)	California Sulphur Co.	1427 E. 4th St., Los Angeles	Ivanpah

LIME AND LIMESTONE

Operator	Product	Address	Location of quarry
Alameda County			
Westvaco Chlorine Prod. Corp.	a, d	Newark	Newark
El Dorado County			
Auburn Chemical Lime Co., Ltd.*	a, b	Auburn	Newcastle
Diamond Springs Lime Co.	a, b, c	Diamond Springs	Diamond Springs
El Dorado Limestone Co., J. H. Bell, Pres.	b	Shingle Springs	Shingle Springs
Inyo County			
Blue Star Mines, Ltd.	b	Room 510, 810 S. Spring St., Los Angeles	Zurich
Los Angeles County			
W. F. Glasser, Inc.	b	713 N. Sepulveda, Brentwood Heights, Los Angeles	Bel-Air
Riverside County			
Howard Small	b, c	311 Main St., Riverside	Riverside
San Bernardino County			
Cal. Portland Cement Co.	a, b	601 W. 5th St., Los Angeles	Colton
Chubbuck Lime Co., Chas. I. Chubbuck	a, b, c	5000 Worth St., Los Angeles	Chubbuck
Mill Creek Limestone Co.	b	6009 Santa Monica Blvd., Los Angeles	
San Bernardino Limestone Co., Inc.	b	1713 W. 8th St., Los Angeles	
Victorville Lime Rock Co.	b	5225 Wilshire Blvd., Los Angeles	Victorville
San Luis Obispo County			
Charles Taylor	b	Salinas	Cambria
San Mateo County			
Pacific Portland Cement Co.	c, d	417 Montgomery St., San Francisco	Redwood City
Santa Clara County			
Bay Shell Co.	c, d	503 Market St., San Francisco	Alviso
Beck Dredging Co.	c, d	Box 113, Coloma	Alviso
Santa Cruz County			
Henry Cowell Lime and Cement Co.	a, b	2 Market St., San Francisco	Santa Cruz
Pacific Limestone Prod. Co.	b, c	Spring St., Santa Cruz	Santa Cruz
Tuolumne County			
Walter C. Sundberg	b	Box 653, Sonora	Sonora
U. S. Lime Products Corp.	a, b	58 Sutter St., San Francisco	Sonora
Ventura County			
Western Lime Products Co.	b, c	6305 Yucca St., Los Angeles	Santa Susana

a. Producer of burnt lime. b. Producer of limestone. c. Agricultural lime. d. Shells.
* Plant now idle.

LITHIA

Operator	Address	Location of mine
American Potash & Chemical Corp.	Trona	Trona

MAGNESITE

Operator	Address	Location of mine
Alameda County		
Westvaco Chlorine Prod. Corp.*	405 Lexington Ave., New York, N. Y.	Newark
Magnesite Products Co., Operator Red Mountain Mine	903 Ray Bldg., Oakland	Red Mountain
Santa Clara County		
Westvaco Chlorine Prod. Corp., Lessee, Western Magnesite Mine	405 Lexington Ave., New York, N. Y.	Red Mountain
Stanislaus County		
Westvaco Chlorine Prod. Corp., Lessee, Bald Eagle Mine	405 Lexington Ave., New York, N. Y.	Gustine

* Magnesium oxide reduced from sea water and used as magnesite.

MAGNESIUM SALTS

Operator	Product	Address	Location of plant
Alameda County			
Westvaco Chlorine Prod. Corp.	Hydroxide	405 Lexington Ave., New York, N. Y.	Newark
Imperial County			
Smith Salt-cake Deposit, C. D. Adams	Sulphate	2073 N. San Antonio Ave., Pomona	Mecca
San Diego County			
Westvaco Chlorine Prod. Corp.	Chloride	405 Lexington Ave., New York, N. Y.	San Diego
San Mateo County			
Marine Magnesium Prod. Corp., R. E. Clarke	Carbonate hydroxide and oxide	South San Francisco	South San Francisco
Plant Rubber & Asbestos Works	Carbonate	537 Brannan St., San Francisco	Redwood City

MANGANESE ORE

Operator	Address	Location of mine
Alameda County		
Bonanza Mine, Coast Manganese Co.	Box 266, Tracy	Tracy
Amador County		
Joseph T. Stacy	Pine Grove	Pine Grove
Imperial County		
V. B. Whedon, d.b.a. Whedon Manganese Mines	214 Bank of America Bldg., Beverly Hills	Glamis
Humboldt County		
The Crossman Co.	Alderpoint	Alderpoint
Marin County		
L. R. Knutte	Nave Bldg., Novato	Novato
Mendocino County		
Chester Linser	Bell Springs	Bell Springs
Lucky Boy Mine, Car-Cor-Van Minerals Co.	La-Z Moon Ranch, Willits	Foster Mt.
Ray F. Helmke	Alderpoint	Alderpoint

MANGANESE ORE—Continued

Operator	Address	Location of mine
Nevada County		
Mangachrome Co., Chas. Neville	Box 448, Auburn	Auburn
Plumas County		
Western Manganese Mine, O. H. Griggs	Crescent Mill	Crescent Mill
Riverside County		
Arlington Group, A. B. Miner	11143 Washington Blvd., Culver City	Inca
San Bernardino County		
Kern Leasing Co., Howard W. Orwig	2157 W. Washington Blvd., Los Angeles	Barstow
Logan Manganese Mine, Suckow Borax Mines, Cons.	40 St. James Park, Los Angeles	Hector
San Joaquin County		
Phio Winegar	Box 246, Vernalis	Vernalis
San Luis Obispo County		
A. T. Adams, Irish Hill Manganese Mine	Box 95, San Luis Obispo	San Luis Obispo
Pacific Coast Manganese Co.	P.O. Box 295, San Miguel	San Miguel
Santa Clara County		
Black Oak & Matt Mine, Barker Corp.	Box 696, Patterson	Patterson
Black Hawk Mine, Mineral Process Development Co.	8733 B St., Oakland	Patterson
Pine Ridge Manganese Mine, Alfred J. Jackson	Morgan Hill	Madrone
Sonoma County		
Aho Mine, Humphreys Gold Corp.	910 First National Bank Bldg., Denver, Colo.	Cazadero
Stanislaus County		
Buckeye Mine, Verner Allen	150 Montgomery St., San Francisco	Vernalis
Liberty & Peter Moy Mines, Humphreys Gold Corp.	910 First National Bank Bldg., Denver, Colo.	Patterson
Tip Top Mine, M. A. Wright	Box 237, Patterson	Patterson
Western Manganese Co.	519 California St., San Francisco	Patterson
J. P. Warren	605 Market St., San Francisco	Patterson
Trinity County		
Ray F. Helmke	Alderpoint	Alderpoint
Manganese Queen Mine, A. Gronzotto	Box 224, Walnut Creek	Forest Glen
McKnight Group, James I. Scott & Co.	P.O. Box 624, Fortuna	Ruth
Tulare County		
Z. E. Page	129 Honolulu St., Lindsay	Camp Nelson

MARBLE (Including Onyx and Travertine)

Operator	Product	Address	Location of quarry
San Luis Obispo County			
Renolds Quarry, Thomas C. Renolds	b	Rt. 1A, Box 53, Paso Robles	Paso Robles
Solano County			
United Quarries, Inc.	c	666 Mission St. San Francisco	Cement

b. Limestone for building and flagstone. c. Travertine.

MINERAL PAINT

Operator	Address	Location of property
San Bernardino County		
Rowe-Buehler Mining Co., Wesley N. Rowe	919 E. Valley Blvd., Rosemead	Lavic
Stanislaus County		
Lester Raggio	Knights Ferry	Knights Ferry

MINERAL WATER

Operator	Address	Location of spring
Butte County		
Richardson Mineral Springs, Lee Richardson, Mgr.	Richardson Springs	Richardson Springs
Colusa County		
Cooks Springs, Don Mason	Williams	Cooks Springs
Contra Costa County		
Alhambra Water Co.	Martinez	Martinez
Fox Water Co.	675 37th St., Oakland	Oak Springs
Lake County		
Adams Mineral Springs, Clarence Prather	Adams, via Middletown	Adams
Bartlett Springs Co.	Bartlett Springs, via Williams	Bartlett Springs
Howard Hot Springs, J. P. Francisco	Middletown	Middletown
Norman Mineral Springs, H. C. Norman, Mgr.	Middletown	Middletown
Witter Medical Springs, W. E. Whitaker	1234 5th Ave., San Francisco	Witter Springs
Los Angeles County		
Deep Rock Artesian Water	4416 York Blvd., Los Angeles	Los Angeles
Elysian Spring Water Co.	1536 Baxter, Los Angeles	Los Angeles
Frespuro Artesian Water	4430 York Blvd., Los Angeles	Los Angeles
Holly Spring Water	2298 Holly Dr., Los Angeles	Los Angeles
Indian Head Mineral Water	3640 N. Griffin Ave., Los Angeles	Los Angeles
Magnetic Spring Water Co.	936 Palm Ave., Sherman	Los Angeles
Mountain Spring Water Co.	226 S. Avenue 54, Los Angeles	Los Angeles
Sparklett Bottled Water Corp.	4500 York Blvd., Los Angeles	Los Angeles
Marin County		
Purity Spring Water Co.	2032 Kearny St., San Francisco	
Napa County		
Calistoga Bottling Works, Ernest Mainini	Calistoga	Calistoga
Napa Soda Springs Co., G. H. T. Jackson	315 Montgomery St., San Francisco	Napa
Napa Vichy Springs, V. Frugoli	146 11th St., San Francisco	Napa
Samuels Soda Springs, T. B. Grigsby	Monticello	Monticelló
Orange County		
La Vida Mineral Springs Co.	Route 1, Placentia	Carbon Canyon
Placer County		
Kilaga Water Co.	Lincoln	Valley

Riverside County		
Beulah Springs, Oscar C. McNicholl	Arlington	Arlington
San Bernardino County		
Arrowhead & Puritas Waters, Inc.	1566 E. Washington Blvd., Los Angeles	Arrowhead
San Diego County		
Cuyamaca Mineral Water, San Diego Ice & Cold Storage Co.	67 8th St., San Diego	San Diego
Rock Springs Co., L. H. Walck	Route 2, Box 224-A, Escondido	Excondido
San Luis Obispo County		
New Crystal Spring Water Co., Ellen M. Hudson	Route 2, Box 11, San Luis Obispo	San Luis Obispo
Shasta County		
Hilltop Spring Water Co.	Redding	Shasta
Mountain Spring Water Co.	1056 Gilbert St., Redding	Redding
Siskiyou County		
Coca Cola Bottling Co., Fred J. Meamber, Prop.	Yreka	Little Shasta
The Shasta Water Co.	6th and Brannan Sts., San Francisco	Dunsmuir
Sonoma County		
Agua Caliente Springs Co., T. H. Corcoran, Prop.	Agua Caliente	Agua Caliente
Barcal Springs, John Kolling	Cloverdale	Cloverdale
Boyes Springs Mineral Water Co.	Boyes Springs	Boyes Springs
Fetters Mineral Springs, George Fetters	Fetters Springs	Fetters Springs

MOLYBDENUM ORE

Mine	Operator	Address	Location of mine
Pine Creek Mine	United States Vanadium Corp.	Bishop	Bishop

PLATINUM

Principal Platinum Producers in California in 1940

Operator	Address	Location of mine
Merced County		
Merced Dredging Co.	Mills Bldg., San Francisco	Snelling
San Joaquin Milling Co.	Mills Bldg., San Francisco	Snelling
Sacramento County		
Capital Dredging Co.	351 California St., San Francisco	Folsom, Sloughhouse
Natomas Co.*	Forum Bldg., Sacramento	Natomas
San Joaquin County		
Gold Hill Dredging Co.	311 California St., San Francisco	Camanche
Siskiyou County		
Yuba Consolidated Gold Fields*	351 California St., San Francisco	Callahan
Stanislaus County		
La Grange Gold Dredging Co.	Mills Bldg., San Francisco	La Grange
Yuba Consolidated Gold Fields*	351 California St., San Francisco	Waterford
Trinity County		
Cinco Mineros Co.	Box 212, Oroville	Hayfork
Junction City Mining Co.	Junction City	Junction City
Yuba County		
Yuba Consolidated Gold Fields*	351 California St., San Francisco	Hammonton

* Platinum metals not sold in 1942.

POTASH

Operator	Address	Location of plant
San Bernardino County		
American Potash and Chemical Co.	Trona	Trona

PUMICE OR VOLCANIC ASH

Operator	Product	Address	Location of property
Inyo County			
American Pumice Co.	a	4031 Goodwin Ave., Los Angeles	Little Lake
Chas. Brown	a	Shoshone	Shoshone
Straight Line Pumice Co., B. J. Compton	a	602 Woodrow St., Bakersfield	Coso Junction
Pacific Coast Pumice Co., C. W. Churchill	a	P.O. Box 656, Bishop	Bishop
Kern County			
Calsilico Corp., G. A. Reynolds	b	445 S. Amalia Ave., Los Angeles	Cantil
Cudahy Packing Co.	b	803 Macy St., Los Angeles	Ceneda
Madera County			
Calif. Industrial Minerals, c/o Forrest S. Taylor	b	Friant	Friant
Elmer Erickson	a	Friant	Friant
Modoc County			
Glass Mt. Volcolite Co., H. W. Free	b, c	Tionesta	Tionesta
Mono County			
American Pumice Co.	a	4031 Goodwin Ave., Los Angeles	Laws
Alexander Jamieson	d	Box 704, Big Pine	Big Pine
Napa County			
Basalt Rock Co.	a	8th St., Napa	Monticello
San Luis Obispo County			
Red Eagle Mine, M. L. Francis	b	Creston	Creston
Siskiyou County			
Glass Mt. Volcolite Co., H. W. Free	a, c, d	Tionesta	Glass Mountain
Mrs. E. L. Jameson	a, d	Tennant	Tennant
Klamath Concrete Pipe Co.	a	Klamath Falls, Ore.	Glass Mountain

a. Pumice, aggregate. b. Volcanic ash. c. Scoria. d. Pumice for scouring brick.

PYRITE

Operator	Address	Location of mine
Shasta County		
Mountain Copper Co., Wm. F. Kett, Mgr.	216 Pine St., San Francisco	Matheson

QUICKSILVER

Principal Producers in California for 1942, out of a Total of 102 Operating Properties

Mine	Operator	Address	Location of mine
Colusa County			
Manzanita	Douglas Mercury Co., Egbert T. Willard	Mills Bldg., San Francisco	Wilbur Springs
Contra Costa County			
Mt. Diablo	Bradley Mining Co.	Crocker Bldg., San Francisco	Clayton
Fresno County			
Archer	Joseph Byles & Sons	Coalinga	Coalinga
Arrambide	General Dredging Co.	Natoma	Mercy Hot Springs
Santa Reta	Anita Mining Co.	3025 Fletcher Drive, Los Angeles	Idria
Kings County			
Dawson Pit	Jack Ellena	Burrel	Avenal
Lake County			
Abbott	International Metals Dev. Inc., C. O. Reed, Mgr.	Williams	Wilbur Springs
Bullion	A. P. Otto & Bert Bachetti	Middletown	Middletown
Great Western	Bradley Mining Co.	Crocker Bldg., San Francisco	Middletown
Helen	Alan Fleishhacker	200 Bush St., San Francisco	Middletown
Mirabel	Mirabel Quicksilver Co.	Middletown	Middletown
Red Elephant	Red Elephant Mines, Inc.	58 Sutter St., San Francisco	Reiff
Sulphur Bank	Bradley Mining Co.	Crocker Bldg., San Francisco	Clearlake Park
Napa County			
Bella Oaks	F. A. Bachich	St. Helena	Oakville
Corona	Twin Peaks Mining Co.	315 Montgomery St., San Francisco	Aetna Springs
Eureka	A. Garcia	Box 513, Middletown	Pope Valley
James Creek	J. L. Stockton	Pope Valley	Pope Valley
Knoxville	Geo. E. Gamble	1431 Waverly St., Palo Alto	Monticello
Manhattan Mine	Chas. Wilson & W. M. Hickox	Monticello	Monticello
Oat Hill	H. W. Gould & Co.	Penthouse, Mills Bldg., San Francisco	Aetna Springs
Oat Hill Extension	Zack Anderson	Middletown	Aetna Springs
San Benito County			
Aurora	G. H. & L. Mining Co., Leon Grivel	1736 W. Slauson Ave., Los Angeles	Idria
El Rey	B. T. Garcia	Hollister	Llanada
Lea-Grante	Lea-Grante Mine, E. H. L. Mitchell, Mgr.	Paicines	Paicines
Lucky Strike	Geo. W. McIntyre	117 Glendora Ave., Long Beach	Paicines
New Idria	New Idria Quicksilver Mining Co.	Mills Bldg., San Francisco	Idria
Panoche	Panoche Quicksilver Mining Co., P. D. Burtt	1078 Mills Bldg., San Francisco	Llanada
Stayton Quicksilver	R. B. Knox	Hollister	Hollister
Wonder	Paul Gonzales	Box 268, Soledad	Idria

San Luis Obispo County			
Buena Vista	A. R. McCartney	Salinas	Paso Robles
Echo Butte	Echo Butte Co., E. T. Atchinson, Mgr.	Cambria	Cambria
Klau	H. W. Gould & Co.	Mills Bldg., San Francisco	Adelaide
Oceanic	American Quicksilver Co.	Cambria	Cambria
Pine Mountain	Oscar E. Hanno	Box 242, Cambria	Cambria
Polar Star	E. D. Rodgers	59 Laurente St., Santa Cruz	San Simeon
Rinconada	W. R. Cantlay	Box 101, Santa Margarita	Santa Margarita
Santa Barbara County			
Los Prietos	Falcon Mercury Co.	Box 117, Santa Barbara	Santa Barbara
Red Rock	Cachoma Mining Co., L. W. Wickes	1206 Pacific Mutual Bldg., Los Angeles	Solvang
Santa Clara County			
Chaboya	L. H. Stotesberry	Rt. 3, Box 296-F, Los Gatos	Almaden
Guadalupe	Laco Mining Co., H. N. Mason	Rt. 3, Box 412, Los Gatos	Los Gatos
Hunt & Grunt	Frank B. Pfeiffer	Almaden	Almaden
New Almaden	New Almaden Corp., C. N. Schuette, Gen. Mgr.	Call Bldg., San Francisco	Almaden
New Almaden Dump	Dave & Ben Black (Owners)	Rt. 3, Box 314, Los Gatos	Almaden
Slater	Mespa Mining Co.	503 Bank of America Bldg., Glendale	Almaden
Siskiyou County			
Great Northern	Empire Canyon Quicksilver Mines	Box 488, Yreka	Hornbrook
Sonoma County			
Big Red	Frank E. Dewey	Cloverdale	Cloverdale
Cloverdale	Schor, Rocca & Garcia	Cloverdale	Cloverdale
Culver Baer	C. A. Baumeister	Cloverdale	Cloverdale
Eagle Rock	L. H. Richard	Box 221, Cloverdale	Cloverdale
Great Eastern	Magee Mercury, Inc.	69 Sutter St., San Francisco	Guerneville
Mt. Jackson	Sonoma Quicksilver Mines, Inc.	58 Sutter St., San Francisco	Guerneville
Skaggs Springs	Star Springs Mercury, Inc.	Skaggs Springs	Skaggs Springs
Socrates	Contact Quicksilver Co.	1924 Broadway, Oakland	Pine Flat
Trinity County			
Altoona	Altoona Quicksilver Mining Co., C. W. Erickson	98 Cervantes, San Francisco	Castella
Yolo County			
Reed	Bradley Mining Co.	Crocker Bldg., San Francisco	Rumsey

SALT

Operator	Address	Location of plant
Alameda County		
American Salt Co., Mrs. Mary Marsicano	341 Broadway, San Francisco	Mt. Eden
Leslie Salt Co.	310 Sansome St., San Francisco	Newark and Mt. Eden
Oliver Bros. Salt Co.	Mt. Eden	Mt. Eden
Imperial County		
Imperial Salt Co.	4000 E. Washington Blvd., Los Angeles	Calipatria
Mullet Island Salt Works	Niland	Niland
Inyo County		
Mineral Materials Co., J. W. Dunton, Mgr.	1145 Westminster Ave., Alhambra	Badwater
Kern County		
Long Beach Salt Co.	P.O. Box 28, Long Beach	Saltdale
Los Angeles County		
Long Beach Salt Co.	P.O. Box 28, Long Beach	Long Beach
Modoc County		
Surprise Valley Salt Works, Joshua H. Hutchinson	Box 26, Cedarville	Lake City
Monterey County		
Monterey Bay Salt Works, E. C. Vierra, Mgr.	Moss Landing	Moss Landing
Orange County		
The Irvine Co.	Tustin	Tustin
San Bernardino County		
California Rock-Salt Co.	2465 Hunter St., Los Angeles	Amboy
Chemical Mines Co., Irving E. Bush	1116 Pacific Mutual Bldg., Los Angeles	Twentynine Palms
Desert Chemical Co.	4031 Goodwin Ave., Los Angeles	Amboy
Rock Salt Products Co.	845 El Centro St., South Pasadena	Salt Marsh
San Diego County		
Western Salt Co.	1245 National Ave., San Diego	San Diego

SANDSTONE

Operator	Address	Location of quarry
Colusa County		
H. F. Galbreath	1668 Lincoln St., Berkeley	
Los Angeles County		
W. F. Glasser, Inc.	713 N. Sepulveda, Brentwood Heights, Los Angeles	Brentwood Heights
Monterey County		
Carmel Stone Quarry, A. L. Possadori	Carmel	Carmel
Sierra Quarry, H. E. Rogers	Box 136, Carmel	Carmel
Napa County		
H. F. Galbreath	1668 Lincoln St., Berkeley	
San Bernardino County		
William C. Buehler	1555 Sunset Ave., Pasadena	Ludlow
San Luis Obispo County		
C. A. Nidever	R.F.D. 1, Box 56, Paso Robles	Paso Robles
Shasta County		
H. F. Galbreath	1668 Lincoln St., Berkeley	Ono

SILICA

Operator	Product	Address	Location of mine
Contra Costa County			
Hazel-Atlas Glass Co. of California, Ltd.	b	87th and G Sts., Oakland	Summerville
Silica Co. of California, Ltd.	b	Brentwood	Brentwood
Kern County			
A. H. Lange	a	Box 194, Tehachapi	Tehachapi
Mariposa County			
The Permanente Metals Corp.	a	Permanente	La Grande
Monterey County			
Owens-Illinois Pacific Coast Co.*	b	135 Stockton St., San Francisco	Del Monte
Orange County			
Arnold Clay Mine, I. P. Arnold	b	1846 W. 83d St., Los Angeles	El Toro
Riverside County			
P. J. Weisel, Inc.	b	La Habra	Corona
San Bernardino County			
Gladding, McBean & Co.	a	2901 Los Feliz Blvd., Los Angeles	----------
Mineral Materials Co., C. W. Dunton, Mgr.	a	1145 Westminster Ave., Alhambra	----------
Suckow Borax Mines Cons.	a	40 St. James Place, Los Angeles	Baldwin Lake
Temescal Clay Co.	c	8601 Dorothy Ave., South Gate	Victorville
San Diego County			
American Radiator & Standard Sanitary Corp.	a	Campo	Campo

a Quartz. b. Glass sand. c. Quartzite.
* Will start producing in 1943.

SILLIMANITE-ANDALUSITE-CYANITE GROUP

Operator	Product	Address	Location of mine
Imperial County			
Vitrefrax Co.	Kyanite	5050 Pacific St., Vernon, Los Angeles	Ogilby
Mono County			
Champion Sillimanite, Inc.	Andalusite	Box 117, Laws	Mocalno

SILVER

Principal Silver Producers in California in 1942. (Not less than 2,000 ounces)

Mine	Type of mine	Operator	Address	Postoffice of mine
Amador County				
Central and Old Eureka	a	Central Eureka Mining Co.	Sutter Creek	Sutter Creek
Butte County				
Surcease	a	Hoefling Bros.	Rt. 1, Oroville	Oroville
Calaveras County				
Carson Hill	a	Carson Hill Gold Mining Corporation	Star Route, Angels Camp	Melones
Inyo County				
Columbia No. 2	m	Shoshone Mines, Inc.	Tecopa	Tecopa
Essex-Columbia (Darwin Lead)	b	Imperial Metals, Inc.	Darwin	Darwin
Last Chance	b	L. D. Foreman	Keeler	Darwin
Ophir	m	C. O. Mittendorf	Box 321, Randsburg	Trona
Pine Creek	r	United States Vanadium Corporation	30 E. 42d St., New York City, N. Y.	Bishop
Reward (Brown Monster)	a	Dick Bright et al.	Independence	Independence
Kern County				
Big Blue	b	Kerns Mines, Inc.	260 California St., San Francisco	Kernville
Cactus Queen	b	Cactus Mines Co.	1206 Pacific Mutual Bldg., Los Angeles	Rosamond
Golden Queen	a	Golden Queen Mining Co.	Mojave	Mojave
Standard Hill	a	Standard Hill Mines Co.	2 Pine St., San Francisco	Mojave
Tropico	a	Burton Bros., Inc.	Rosamond	Rosamond
Whitmore	b	James Ritchie	Mojave	Mojave
Yellow Aster	c	Anglo American Mining Corporation, Ltd.	206 Sansome St., San Francisco	Randsburg
Mariposa County				
Mount Gaines	a	Mount Gaines Mining Co.	Hornitos	Hornitos
Mono County				
Standard	a	Roseklip Mines Co.	Bodie	Bodie
Nevada County				
Empire Star et al.	a	Empire Star Mines Co., Ltd.	14 Wall St., New York, N. Y.	Grass Valley
Idaho Maryland	a	Idaho Maryland Mines Corporation	Box 1028, Grass Valley	Grass Valley
Lava Cap	a	Lava Cap Gold Mining Corporation	Box 780, Nevada City	Grass Valley

a. Lode gold mine. b. Gold-silver mine. c. Tailings dumps. d. Pocket. e. Dredge (bucketline). f. Drift mine. g. Hydraulic mine. h. Dragline operations. j. Copper-gold mine. k. Power shovel or dryland dredge. m. Lead mine. n. Suction dredge. p. Silver-lead-zinc. r. Tungsten mine.

SILVER—Continued

Principal Silver Producers in California in 1942. (Not less than 2,000 ounces)

Mine	Type of mine	Operator	Address	Postoffice of mine
Orange County				
Silverado (Blue Light)	p	Blue Light Silver Mines Co.	508 Chapman Building, Fullerton	Fullerton
Placer County				
Alabama	a	Alabama California Gold Mines Co.	Box 488, Auburn	Penryn
Sacramento County				
Natomas	e	Natomas Company	Forum Bldg., Sacramento	Natoma
San Bernardino County				
Bagdad-Chase	a	Frank Royer	Red Mountain	Ludlow
Kelly	b	Frank Royer	Red Mountain	Red Mountain
Shasta County				
Iron Mountain	j	The Mountain Copper Co., Ltd.	216 Pine St., San Francisco	Matheson
Tuolumne County				
Eagle-Shawmut	b	Miller and Clemson	4800 Santa Fe Ave., Los Angeles	Chinese Camp

a. Lode gold mine. b. Gold-silver mine. c. Tailings dumps. d. Pocket. e. Dredge (bucketline). f. Drift mine. g. Hydraulic mine. h. Dragline operations. j. Copper-gold mine. k. Power shovel or dryland dredge. m. Lead mine. n. Suction dredge. p. Silver-lead-zinc. r. Tungsten mine.

SLATE

Operator	Product	Address	Location of quarry
El Dorado County			
Pacific Minerals Co., Ltd.	b, c	337 10th St., Richmond	Chili Bar

b. Granules. c. Flagging.

SOAPSTONE AND TALC

Operator	Product	Address	Location of mine
El Dorado County			
Pacific Minerals Co., Ltd., Chas. S. Renwick, Jr.	a	337 10th St., Richmond	Shrub
Inyo County			
Blue Star Mines, Ltd.	b	810 S. Spring St., Los Angeles	Kingston Mountain
Death Valley Talc Co.	b	806 Trans America Bldg., Los Angeles	Furnace Creek
Monarch Talc Mines	b	649 S. Olive St., Los Angeles	Shoshone
Muroc Clay Co.	b	5525 Randolph St., Maywood	Shoshone
W. J. Quackenbush	b	917 Ronan Ave., Wilmington	
Palmer Development Co.	b	Box 301, Lone Pine	Lone Pine
Sierra Talc Co., Franklin Booth, Mgr.	b	428 Union League Bldg., Los Angeles	Keeler
White Mountain Talc Co., Wm. M. Bonham	b	Lone Pine	Lone Pine
San Bernardino County			
Sierra Talc Co.	b	500 Union League Bldg., Los Angeles	Silver Lake
Southern Calif. Minerals Co., W. S. Skeoch	b	320 Mission Rd., Los Angeles	Kingston Mountain
Western Talc Co.	b	1901 E. Slauson Ave., Los Angeles	Death Valley

a. Soapstone. b. Talc.

SODA

Operator	Product	Address	Location of plant
Imperial County			
C. D. Adams, Smith Salt-Cake Deposit	c	2073 N. San Antonio Ave., Pomona	Mecca
Inyo County			
Natural Soda Products Co.	a, d	405 Montgomery St., San Francisco	Keeler
Pacific Alkali Co.	a, d	1206 Pacific Mutual Bldg., Los Angeles	Bartlett
San Bernardino County			
American Potash & Chemical Co.	a, c	Trona	Trona
Chemical Mines Co., Irving E. Bush, Mgr.	c	1116 Pacific Mutual Bldg., Los Angeles	Dale Lake
Desert Chemical Co.	c	4031 Goodwin Ave., Los Angeles	Amboy
West End Chemical Co.	a	Latham Square Bldg., Oakland	West End

a. Soda ash. c. Salt cake. d. Trona.

STONE, MISCELLANEOUS

Under the heading of 'miscellaneous stone' there are four divisions—crushed rock, grinding mill pebbles, paving blocks, and sand and gravel. Crushed rock includes crushed rock that is used in macadam, ballast and for concrete; also rock used for rubble and riprap.

NOTE.—The California State Highway Commission, the various counties, U. S. Forest Service and U. S. Bureau of Public Roads produce both crushed rock and sand and gravel in various places in the State used in construction and maintenance of highways, but not specified in this listing.

Operator	Product	Address	Location of pit or quarry
Alameda County			
Ariss-Knapp Co.	b	961 41st St., Oakland	
California Rock & Gravel Co.	a	1800 Hobart Bldg., San Francisco	Livermore
J. Catucci	b	1212 18th Ave., Oakland	Oakland
Easter Hill Properties Co.	b	First National Bank Bldg., Richmond	
Heafey-Moore Co., Leona Quarry	b	344 High St., Oakland	Oakland
Henry J. Kaiser Co.	a, b	1522 Latham Square Bldg., Oakland	Radum
Kemper Bros.	b	5998 Strobridge Ave., Hayward	Hayward
Leslie Salt Co.	b	310 Sansome St., San Francisco	Newark
Pacific Coast Aggregates, Inc.	a, b	85 2d St., San Francisco	Eliot and Niles
Alfred W. Petersen	a	Box 943, Livermore	Livermore
A. W. Petersen	a	Box 110, Livermore	Livermore
Thos. B. Russell Quarry, T. B. Russell	b	1192 Russell Way, Hayward	Hayward
San Leandro Rock Co., Lake Chabot Quarry	b	2485 Washington St., San Leandro	Lake Chabot
Superior Rock Co.	b	Broadway and McAdams St., Oakland	Oakland
Amador County			
Charles Ayers	a	P.O. Box 266, Sutter Creek	Jackson
Butte County			
Bechtel-Kaiser Rock Co., R. J. Kennedy, Mgr.	a, b	Oroville	Oroville
Pacific Coast Aggregates, Inc.	a, b	85 2d St., San Francisco	Oroville
A. Teichert & Son, Inc.	b	1846 37th St., Sacramento	Chico
Calaveras County			
Neilsen Gravel Plant, Att'n R. Neilsen	a	Box 14, San Andreas	San Andreas
Contra Costa County			
Antioch Asphalt Co.	a	Claremont Hotel, Berkeley	Antioch
Basalt Rock Co.	a	8th St., Napa	Antioch
Blake Bros., Anson Blake	b	204 Balboa Bldg., San Francisco	Point Richmond
Henry J. Kaiser Co.	a	1522 Latham Square Bldg., Oakland	Antioch and Upton
Stege Quarry, H & B Rock Co.	b	7360 Schmidt Lane, El Cerrito	El Cerrito
The Roberts Bros.	c	Pittsburg	Clayton
Silica Co. of Calif., Ltd.	c	Brentwood	Brentwood
El Dorado County			
Diamond Springs Lime Co.	b	Diamond Springs	Diamond Springs

Fresno County			
Central Rock & Sand Co.	a, b	Sanger	Sanger
Grant-Pacific Rock Co.	a, b	Box 649, Fresno	El Prado
Carl Merk	a	North and Cherry Sts., Fresno	Fresno
Stewart & Nuss	a, b	410 Thorne St., Fresno	Herndon
Volpa Bros.	a	428 W. Whites Bridge, Fresno	Fresno
Glenn County			
E. B. Bishop	a	Box 325, Orland	Wyo
Southern Pacific Co.	a	65 Market St., San Francisco	Wyo
A. Teichert & Sons	b	1846 37th St., Sacramento	Willows
Humboldt County			
D. A. Boyd	a	R.F.D., Arcata	Arcata
Tom Hull	a	Eureka	Eureka
Northwestern Pacific R.R. Co., Wm. N. Neff, Gen. Sup't.	a	Sausalito	Sequoia
Imperial County			
Nixon Pipe Yard	a	Seeley	Seeley
R. T. Pinner	a	Brawley	Brawley
W. M. Winn	a	Box 1136, Brawley	Brawley
Inyo County			
Inyo Marble Co.	d	726-732 E. 29th St., Los Angeles	Lone Pine
Kern County			
Bakersfield Rock and Gravel Co.	a, b	Box 395, Station A, Bakersfield	Bakersfield
Griffith Co.	b	Bakersfield	Bakersfield
C. W. Hartman	a, b	W. Oak St., Bakersfield	Bakersfield
Kern Rock Co., Ltd.	a, b	Box 1697, Bakersfield	Kern River
Lassen County			
Red River Lumber Co.	a	Westwood	Westwood
Los Angeles County			
Arrow Rock Co.	a	Box 155, Monrovia	Monrovia
A. T. & S. F. R.R., I. L. Hibbard, Gen. Mgr.	a	609 Kerckhoff Bldg., Los Angeles	Forbes
Guy F. Atkinson Co., et al.	b	Box 259, Long Beach	Santa Catalina
Azusa Rock & Sand Co.	a, b	Rural Delivery, Azusa	Azusa
Richard R. Ball	a	Box 96, Walteria	Walteria
Blue Diamond Corp., Ltd.	a	1650 S. Alameda St., Los Angeles	El Monte and Roscoe
Wm. J. Bonfield	g	2008 Laurel Canyon Rd., Los Angeles	Hollywood
Chandler Palos Verdes S. & G., L. Chandler	a, b	Lomita	Lomita
City Rock Co.	a, b	Box A, Sunland	Sunland
Coast Brick Co.	c	P.O. Box 326, Moneta	Moneta
Columbia Construction Co.	b	Box 259, Long Beach	Catalina Island
Consolidated Rock Products Co.	a, b	2730 S. Alameda St., Los Angeles	Los Angeles, Azusa, Roscoe and Vernon

a. Sand and gravel. b. Crushed rock (macadam, ballast, rubble, rip-rap, etc.). c. Molding sand. d. Granules for roofing, terrazzo. e. Slag and volcanic cinder. f. Tube-mill pebbles. g. Decomposed granite.

STONE, MISCELLANEOUS—Continued

Under the heading of 'miscellaneous stone' there are four divisions—crushed rock, grinding mill pebbles, paving blocks, and sand and gravel. Crushed rock includes crushed rock that is used in macadam, ballast and for concrete; also rock used for rubble and riprap.

Operator	Product	Address	Location of pit or quarry
Los Angeles County—Continued			
Ducey & Atwood Rock Co., R. K. Atwood, Pres.	a b	Box 194, East Pasadena	East Pasadena
W. F. Glasser, Inc.	b	713 N. Sepulveda, Brentwood Heights, Los Angeles	Brentwood Heights
Graham Bros.	a, b	3245 Fowler Ave., Los Angeles	El Monte and Roscoe
Granite Material Co.	g	8200 Tujunga Ave., North Hollywood	Roscoe
John D. Gregg	a, b	Box 110, Whittier	Whittier
Lindauer Corp.	a	Box 208, La Habra	La Habra
Los Angeles Decomposed Granite Co.	g	2171 W. Washington, Los Angeles	Los Angeles
Manning Bros. Rock & Sand Co.	a, b	Irwindale	Irwindale
Moe Bros.	g	8170 Lauremont Dr., Hollywood	Laurel Canyon
Owl Rock Products Co.	a	P.O. Box 187, Monrovia	Monrovia
Pacific Rock & Gravel Co.	a, b	800 Lane Mortgage Bldg., 208 W. 8th St., Los Angeles	
Reynolds Crushed Gravel, Inc.	g	914 N. Humphreys Ave., Los Angeles	Los Angeles
Security Material Co.	b	1131 N. Highland Ave., Los Angeles	Los Angeles
Edwin Sidebotham & Sons, Inc., Sidebotham Sand Plant	a	McFarland and L Sts., Wilmington	Lomita
Marin County			
Hutchison Co.	b	329 17th St., Oakland	San Quentin
Marin Gravel Co.	a	Point Reyes	Point Reyes
Mariposa County			
D. H. Miles	b	Mariposa	Mariposa
Yosemite National Park	a, b	Yosemite	Yosemite Nat'l Park
Mendocino County			
John Freitas	a	Ukiah	Ukiah
Merced County			
Bair Creek Sand & Gravel Co., J. W. Huffman	a	Merced	Merced
C. V. Jones	a	Rt. 1, Box 132, Winton	Winton
Los Banos Gravel Co.	a	Rainbow Auto Court, Los Banos	Los Banos
Modoc County			
Great Northern Railway, A. E. Knight, Supt.	e	Klamath Falls, Ore.	Mammoth
Moyer Gravel Co.	a	P.O. Box 25, Alturas	Alturas
Monterey County			
Del Monte Properties, C. S. Olmsted	g	Del Monte	Del Monte
M. J. Murphy	a	Monte Verde and 9th Sts., Carmel	Carmel
Pacific Coast Aggregates, Inc.	a	85 2d St., San Francisco	Lapis and Prattco

Napa County			
Basalt Rock Co.	b	8th St., Napa	Napa
Juarez Quarry, M. G. Reidenbach	b	Napa	Napa
Harold Smith	a	St. Helena	St. Helena
Orange County			
Geo. T. Calhoun	a	P.O. Box 1741, Santa Ana	Garden Grove
California Rock Co.	a	Rural Delivery, Orange	Orange
Consolidated Rock Products Co.	a	2730 Alameda S. St., Los Angeles	Fullerton and Orange
Fowler Sand & Gravel Co.	a	1178 S. Flower St., Santa Ana	Santa Ana
Foster Sand & Gravel Co.	a	524 W. Commonwealth, Fullerton	----------------------
V. J. Frye Foundry Supplies	c	1302 N. Flower St., Santa Ana	Santa Ana
Graham Bros.	a	3425 Fowler Ave., Los Angeles	San Juan Capitstrano
Reynolds Gravel Service	g	Box 499, Orange	Orange
B. A. Stoffel	a	Anaheim	Anaheim
Placer County			
Pacific Gas & Electric Co.	a	245 Market St., San Francisco	Dutch Flat
Union Granite Co., Ruhkala Bros.	b	Rocklin	Rocklin
Riverside County			
A. T. & S. F. R.R. Co., I. L. Hibbard, Gen. Mgr.	b	609 Kerckhoff Bldg., Los Angeles	Box Springs
Guy F. Atkinson Co., George Pollock Co.	b	P.O. Box 259, Long Beach	Riverside
Emil Johnson	b	Perris	Perris
Kumpe-Hauser Corp., Ltd., Ormand Quarry	b	Box 827, Riverside	Bly Junction
Kuster & Waterburg	a	Corona	Corona
City of Riverside	b	Riverside	Riverside
San Gorgonio Rock Co.	a, b	Banning	Banning
Service Rock Co.	a	Box 309, Riverside	Riverside
Transit Mixed Concrete Co.	a, b	3464 E. Foothill Blvd., Pasadena	Corona
P. J. Weisel, Industrial Sands	a, c	La Habra	Corona
Sacramento County			
American River Sand & Gravel Co.	a	Box 156, Perkins	Perkins
Brighton Sand & Gravel Co.	a, b	P.O. Box 2604, Sacramento	Sacramento
Cannon & Co.	c	Box 281, Sacramento	Ben Ali
Del Paso Rock Products Co.	a, b	Rt. 5, Box 1200, Sacramento	Del Paso
Folsom State Prison	a, b	Represa	Represa
Mucke Sand & Gravel Co.	a, b	1433 57th St., Sacramento	Mayhew
Pacific Coast Aggregates, Inc.	a, b	85 2d St., San Francisco	Fair Oaks, Mayhew and American River
Perkins Gravel Co.	a, b	Perkins	Perkins
Robert Powell & Co.	a	Box 815, Sacramento	American River
San Benito County			
Granite Rock Co.	b	Drawer M., Watsonville	Logan

a. Sand and gravel. b. Crushed rock (macadam, ballast, rubble, rip-rap, etc.). c. Molding sand. d. Granules for roofing, terrazzo. e. Slag and volcanic cinder. f. Tube-mill pebbles. g. Decomposed granite.

STONE, MISCELLANEOUS—Continued

Under the heading of 'miscellaneous stone' there are four divisions—crushed rock, grinding mill pebbles, paving blocks, and sand and gravel. Crushed rock includes crushed rock that is used in macadam, ballast and for concrete; also rock used for rubble and riprap.

Operator	Product	Address	Location of pit or quarry
San Bernardino County			
A. T. & S. F. R.R.	a, b	600 Kerckhoff Bldg., Los Angeles	Gale
Columbia Construction Co.	b	1300 W. 7th St., Los Angeles	Declezville
Concrete Rock & Sand Co.	a	899 La Cadena St., Colton	Colton
Consolidated Rock Products Co.	a, b	2730 S. Alameda St., Los Angeles	----
Geo. Herz & Co.	a	Base Line & Lytle Sts., San Bernardino	San Bernardino
Holiday Rock Co.	a, b	Upland	Upland
Johnson Fourth Street Rock Crusher	a, b	305 Lytle St., San Bernardino	San Bernardino
Palm Springs Builders' Supply Co.	a, b	Whitewater	Palm Springs
Redlands Gravel Co.	a, b	Redlands	Redlands
San Bernardino Rock & Gravel Co.	a, b	Box 249, San Bernardino	San Bernardino
Sharp & Fellows Cons. Co.	b	Central Bldg., Los Angeles	Oro Grande
Southern Counties Rock Co.	b	P.O. Box 127, Monrovia	Yermo
Triangle Rock & Gravel Co.	a, b	San Bernardino	San Bernardino
San Diego County			
Billings Truck Co.	a, b	1950 Main St., San Diego	Chula Vista
Calaveras Materials Co.	b	Oceanside	Oceanside
Canyon Rock Co.	a, b	Box F, Hillcrest Sta., San Diego	San Diego
Claudell & Johnson	a	Box 246, Hillcrest Sta., San Diego	Mission Valley
Crystal Silica Co.	a, c, h	717 E. 61st St., Los Angeles	Oceanside
Daley Corp., Geo. Dailey	a	4430 Boundary St., San Diego	San Diego
Elvira M. Hubbard	c	406 W. Nutmeg St., San Diego	San Diego
John T. Momand	f	Carlsbad	Carlsbad
Nelson & Sloan	a	Box 832, Chula Vista	Chula Vista
Oceanside Rock & Sand Co.	a, f	Oceanside	Oceanside
D. M. Sebastian	a	Mission Valley, San Diego	Mission Valley
San Francisco County			
Mission Quarry Co.	b	210 Balboa Bldg., San Francisco	San Francisco
San Joaquin County			
Frank B. Marks & Sons	a, b	Newman	Newman
Mokelumne Sand & Gravel Co., D. M. Dyer	a	527 E. Lodi Ave., Lodi	Lodi
Pacific Coast Aggregates, Inc.	a, b	85 2d St., San Francisco	Riverbank
Elmer J. Warner	a	1103 Sycamore, Stockton	Stockton
San Luis Obispo County			
Guiton Molding Sand, Harold E. Guiton	c	Oceano	Oceano
Harold B. Roselip	a, b	615 Grand Ave., San Luis Obispo	Atascadero

San Mateo County			
Canadas Quarry, California Paving Co.	b	363 N. El Dorado St., San Mateo	Half Moon Bay
Golden West Quarry	b	Geneva and Santos Sts., San Francisco	Colma
Holy Cross Cemetery	b	Colma	Colma
Industrial Mineral Products, J. W. Jessiman	c	230 7th St., San Francisco	South San Francisco
Rockaway Quarry, Inc.	b	1111 Mills Tower, San Francisco	Rockaway Beach
Santa Barbara County			
Gates Gravel Plant, Frank H. Gates	a	Santa Maria	Sisquoc
H. G. Iliff & Son	a	Santa Maria	Santa Maria
Southern Pacific R. R. Co., Ass't Chief Engineer	b	Southern Pacific Bldg., San Francisco	Arlight
Santa Clara County			
Carroll Gravel Pit, R. D. Carroll	a	R.F.D. 14, Box 310A, San Jose	San Jose
Chas. W. Hamilton	a	Senter Rd., San Jose	San Jose
Los Gatos San and Gravel Co.	a	Los Gatos	Los Gatos
Pacific Coast Aggregates, Inc.	a, b	85 2d St., San Francisco	Coyote and Campbell
A. J. Raisch	a	900 W. San Carlos St., San Jose	San Jose
Rhodes & Robinson, Stanford Quarry	b	Box 325, Palo Alto	Palo Alto
Western Gravel Corp.	a	Box 855, Campbell	Campbell
Santa Cruz County			
Henry J. Kaiser Co.	a	1522 Latham Square Bldg., Oakland	Olympia
Pacific Coast Aggregates, Inc.	a	85 2d St., San Francisco	Olympia
Pacific Limestone Products Co.	b	Santa Cruz	Santa Cruz
Shasta County			
Columbia Construction Co., Henry J. Kaiser Co.	a	Latham Square Bldg., Oakland	Cottonwood
Diestelhorst Gravel Plant, Chas. Diestelhorst, Jr.	a, b	1078 West St., Redding	Redding
Hein Bros. Basalt Rock Co.	a	Petaluma	Redding
Pacific Gas & Electric Co., Att'n W. G. Vincent	a, b	245 Market St., San Francisco	
City of Redding	a, b	Redding	Redding
Southern Pacific R. R. Co., Ass't Chief Engineer	c	Southern Pacific Bldg., San Francisco	Kennett
A. Teichert & Son, Inc.	b	1846 37th St., Sacramento	Redding
Siskiyou County			
James Baker	a	Klamath Falls, Ore.	Mt. Hebron
A. E. Kottinger	a	Mt. Shasta	Mt. Shasta
Southern Pacific R. R. Co., Ass't Chief Engineer	c	Southern Pacific Bldg., San Francisco	Kegg
A. Young	b	345 N. Main St., Yreka	Yreka
Solano County			
J. M. Nelson, Cordelia Quarry	b	Cordelia	Cordelia
Red Rock Quarry, Ltd.	b	Box 671, Vallejo	Vallejo
Sonoma County			
Basalt Rock Co.	a	8th St., Napa	Healdsburg
Hein Bros. Basalt Rock Co., Mark Hein, Pres.	b	Petaluma	Petaluma
Macco-Chase Construction Co.	b	815 N. Parmont Blvd., Clearwater	
Stony Point Quarry, W. A. Wilson	b	Petaluma, Star Route	Stony Point

a. Sand and gravel. b. Crushed rock (macadam, ballast, rubble, rip-rap, etc.). c. Molding sand. d. Granules for roofing, terrazzo. e. Slag and volcanic cinder. f. Tube-mill pebbles. g. Decomposed granite. h. Filter and blast sand.

STONE, MISCELLANEOUS—Continued

Under the heading of 'miscellaneous stone' there are four divisions—crushed rock, grinding mill pebbles, paving blocks, and sand and gravel. Crushed rock includes crushed rock that is used in macadam, ballast and for concrete; also rock used for rubble and riprap.

Operator	Product	Address	Location of pit or quarry
Stanislaus County			
A. T. & S. F. Railway Co.		560 S. Main St., Los Angeles	
Tony Francisco	a	Crows Landing	Crows Landing
Gravel Products Co.	a	Hughson	Hughson
Wes Haslan	a	Oakdale	Oakdale
Hughson Gravel Co.	a	301 N. Santa Cruz Ave., Modesto	Hughson
O. A. Kauffman	a	803 1st St., Modesto	Modesto
Frank B. Marks & Sons	a	Newman	Newman
Oakdale Irrigation Dist.	a	Oakdale	Oakdale
Putnam Sand & Gravel Co.	a	Box 486, Modesto	Modesto
J. P. Scanlon, Scanlon Gravel Pit	a	Patterson	Crows Landing
Chas. Warner	a	Modesto	Modesto
Trinity County			
Northwestern Pacific R.R. Co., Wm. N. Neff, Gen. Sup't	b	Sausalito	Island Mountain
Tulare County			
Dinuba Cement Co.	a	Dinuba	Dinuba
O. C. Jeffers	a	1032 River Rd., Porterville	Porterville
Porterville Cement Pipe Co.	a	Box 396, Porterville	Porterville
Tuolumne County			
Beerman & Jones	b	Sonora	Soulsbyville
Ventura County			
Guy F. Atkinson Co. & George Pollock Co.	a, b	P.O. Box 259, Long Beach	Broome Ranch, Conejo
Montalvo Rock Co.	a	Box 188, Montalvo	Montalvo
Santa Paula Rock Co.	a, b	Box 671, Santa Paula	Santa Paula
Saticoy Rock Products Co.	a, b	Ventura	Saticoy-Ventura
J. S. Toler	c	1257 Poli St., Ventura	Ventura
A. N. Vela	a	432 N. Oak St., Santa Paula	Santa Paula
Yolo County			
Leroy Kerr	a	Yolo	Yolo
Joe Schwarzgruber	a	Woodland	Woodland
George Summers	a	Woodland	Woodland
A. Teichert & Sons, Inc.	b	1846 37th St., Sacramento	Woodland
Yolo Gravel Co.	a	Box 7, Yolo	Yolo
Yuba County			
Hemstreet & Bell	a, b	501 11th St., Marysville	Marysville
Pacific Coast Aggregates, Inc.	a	85 2d St., San Francisco	Marysville
Yuba River Sand Co.	a	Marysville	Marysville

b. Crushed rock (macadam, ballast, rubble, rip-rap, etc.). c. Molding sand. d. Granules for roofing, terrazzo. e. Slag and volcanic cinder. f. Tube-mill

STRONTIUM

Operator	Address	Location of mine
Imperial County		
Pan-Chemical Co., John A. Stevens	1396 N. Harvard St., Claremont	Fish Mts.
San Bernardino County		
E. I. DuPont de Nemours & Co.	DuPont Bldg., Wilmington, Dela.	Argus
Wesley N. Rowe	919 E. Valley Blvd., Rosamond	Lavic

SULPHUR

Operator	Address	Location of mine
Inyo County		
Pacific Sulphur Co.	433 S. Spring St., Los Angeles	Last Chance Mts.

TITANIUM

Operator	Address	Location of mine
Los Angeles County		
Mrs. Harvey R. Smith	421 S. Harvard Blvd., Los Angeles	Hermosa Beach

TUNGSTEN

Principal Tungsten Properties in California During 1942

Mine	Operator	Address	Location of mine
Fresno County			
Garnet	P. G. Armstrong, et al.	Auberry	Auberry
Garnet Dyke	Sheridan, Bennett, & Kidder	Kings River Hatchery	Kings River
Houghton Bros.	Houghton Bros.	Rt. 2, Box 684, Sanger	Kings River
Kings River	B. Bazuik	717 Voorman, Fresno	Kings River
------	Kings River Mines, L. O. Gillice	600 Rowell Bldg., Fresno	Kings River
Quigley	Perry Root	Auberry	Kings River
Inyo County			
Crawford Dep.	Tungsten Corp., P. N. Stevens	6233 Hollywood Blvd., Los Angeles	Bishop
Jack Rabbit	El Diablo Mining Co., H. O. Johanson	Box 567, Bishop	Bishop
Marble	Robert W. Kelso	Bishop	Bishop
Panaminas	Panaminas Inc., F. C. Buckland, Gen. Mgr.	Box 734, Bishop	Bishop
Pine Creek	United States Vanadium Corp.	30 E. 42d St., New York, N. Y.	Bishop
Round Valley	California Tungsten Mining & Milling Co., N. C. McAldo	Rt. 2, Bishop	Bishop
St. Charles et al.	Pacific Tungsten Co.	9730 Wilshire Blvd., Beverly Hills	Darwin
Tungsten Blue	Bishop Tungsten Corp.	Box 395, Bishop	Bishop
Kern County			
Bason View	M. J. Gusty	Bodfish	Havilah
------	Sam Huckabay	Rt. 4, Box 319, Bakersfield	Glennville
Mountain View	Bell & Durnal	259 Haberfelde Bldg., Bakersfield	Caliente
Pine Tree	Carl H. Claussenius	P.O. Box 797, Tehachapi	Tehachapi
------	Ray Ruthledge	Glennville	Glennville
Tungsten Buck	R. L. Coughran	Isabella	Isabella
Tungsten Chief	T. J. McKee, et al.	Caliente	Caliente
Tungsten Hill	E. E. Lambert & M. T. Smith	Havilah via Caliente	Havilah
Mono County			
Black Rock	A. E., S. H. & John Beauregard	Bishop	Benton
Scheelore	H. A. Van Loon	Bishop	McGee Creek
San Bernardino County			
Atolia	Atolia Mining Co.	1022 Crocker Bldg., San Francisco	Atolia
Bernice	Vaughn Maynard	R.F.D. 4, Box 30, Santa Ana	Baker
El Mirage	Mine Development Co.	Box 545, Mojave	Adelanto
------	General Industries Corp.	530 W. 6th St., Los Angeles	Red Mountain
------	William W. Hartman	1230 E. 109th St., Los Angeles	Cima
Monarch Rand	Monarch Rand Mining Co.	Box 366, Randsburg	Randsburg
Spud Patch Placers	Hoefling Bros.	1820 E St., Sacramento	Atolia

Tulare County			
Carver	A. M. Donnelly	Box 45, Johnsondale	
Will Gill Ranch	Tulare Co. Tungsten Mines	725 Washington Bldg., 311 S. Spring St., Los Angeles	Lindsay
Tungstore	Tungstore Mines	929 American Ave., Long Beach	Posey
	Yokohl Valley Tungsten Mining Co.	Box 474, Exeter	Exeter
Tuolumne County			
	Tuolumne Tungsten Mine	Twain Harte	Twain Harte

ZINC

Principal Zinc Producers in California in 1942. (Not less than 10,000 pounds.)

Mine	Operator	Address	Post office of mine
Inyo County			
Colorado	Combined Metals Reduction Co.	Box 84A, Lone Pine	Panamint Springs
Honolulu	Southwest Lead & Zinc Co.	433 S. Spring St., Los Angeles	Trona
Leary	Desert Miners	Lone Pine	Keeler
San Bernardino County			
Carbonate King	W. F. Huston	Mountain Pass via Nipton	Nipton

SMELTERS, CUSTOM MILLS, ORE AND METAL BUYERS

Reporting Purchase of California Metals (except Gold and Silver) Produced in 1942

Name	Address	Location of plant	Metals reported purchased
American Smelting & Ref. Co.	120 Broadway, New York, N. Y.	Garfield, Utah	Copper, Lead
American Smelting & Ref. Co.	120 Broadway, New York, N. Y.	Hayden, Ariz.	Copper
American Smelting & Ref. Co.	120 Broadway, New York, N. Y.	Murray, Utah	Lead, copper
American Smelting & Ref. Co.	405 Montgomery St., San Francisco	Selby, Calif.	Copper, Lead
American Smelting & Ref. Co.	120 Broadway, New York, N. Y.	Tacoma, Wash.	Copper, Lead
C. L. Ach	2309 E. 8th St., Los Angeles	Los Angeles	Tungsten
Bethlehem Steel Co.	20th and Illinois Sts., San Francisco	San Francisco	Chromite
Bradley & Ekstrom	320 Market St., San Francisco	San Francisco	Chromite, Manganese, Iron
Coast Chemical Division F. W. Berk & Co., Inc.	Sharon Bldg., San Francisco	San Francisco	Quicksilver
Colorado Fuel & Iron Co.	225 Canal St., Pueblo, Colo.	Pueblo, Colo.	Manganese Ore
General Dry Batteries, Inc.	13000 Athens Ave., Cleveland, Ohio	Cleveland, Ohio	Manganese
H. W. Gould & Co.	Mills Bldg., San Francisco	San Francisco	Quicksilver
The Harshaw Chemical Co.	Box 37, El Segundo	El Segundo	Antimony and Quicksilver
International Smelting & Ref. Co.	Tooele, Utah	Tooele, Utah	Copper, Lead, Zinc
Magna Copper Co.	Superior, Ariz.	Superior, Ariz.	Copper
Medford Chemical Co.	1026 Santa Fe, Los Angeles	Los Angeles	Quicksilver
Mercantile Metals & Ore Corp.	60 Wall St., New York, N. Y.	New York	Quicksilver
Metals Reserve Co.	Washington, D. C.	Various stock piles	Chromite, Manganese Ore, Quicksilver, Tungsten Ore
Ore, Metals & Engineering Corp.	112 Market St., San Francisco	San Francisco	Chromite
Pacific Vegetable Oil Co., Bernard T. Rocca	62 Townsend St., San Francisco	San Francisco	Quicksilver
Pacific Zinc Oxide Co.	216 Pine St., San Francisco	Richmond	Zinc
Quicksilver Producers Ass'n, Irving Ballard, Sec'y	407 Sansome St., San Francisco	San Francisco	Quicksilver
U. S. Smelting, Refining & Mining Co.	Newhouse Bldg., Salt Lake City, Utah	Midvale, Utah	Copper, Lead, Zinc
U. S. Vanadium Corp.	114 Sansome St., San Francisco	San Francisco	Chromite
West Coast Tungsten Co.	9730 Wilshire Blvd., Beverly Hills	Darwin	Tungsten
Western Gold & Platinum Works	589 Bryant St., San Francisco	San Francisco	Platinum
Wildberg Bros. Smelting & Ref. Co.	742 Market St., San Francisco	San Francisco	Platinum

APPENDIX B.

TOTAL RECORDED MINERAL PRODUCTION BY COUNTIES

Herein in the tabulations following is presented the total mineral yield of each county of the State from the earliest available records to and including 1943. These tables were compiled, and first printed in the November, 1922, chapter of State Mineralogist's Report XVIII which included the data to the end of 1921; then later revised to include data to the end of 1927, 1934, and 1941, respectively, in the statistical bulletins for those years.

In a number of cases it is known that there was production of specific minerals in the years previous to the earliest years shown in these tabulations; but unfortunately, there are few detailed or accurate records showing county segregations prior to 1894 when compilation of the statistical records of the California State Mining Bureau began. For gold and silver, the published reports of the U. S. Geological Survey and the Director of the Mint give county segregations back to 1880; but, prior to that year, only the State total annually. In the case of quicksilver, there are authentic records for all of the important mines, from which are compiled county tables for the early years.

The "unapportioned" column is necessitated by the fact that in many cases there is but a single operator or mine producing a given mineral in the county. As it is the policy of the Division of Mines not to reveal the individual's private business without his consent, the values of such products are combined.

MINERAL PRODUCTION

Year	Brick		Chromite		Pottery clay		Coal		Manganese	
	M	Value	Tons	Value	Tons	Value	Tons	Value	Tons	Value
1890			[1]397	$534					[1]	
1891			257	344						
1892										
1893										
1894	7,500	$37,500							468	$4,[illegible]
1895	12,000	60,000							600	5,[illegible]
1896	7,000	35,000							318	3,[illegible]
1897	6,500	35,750					21,900	$50,370	504	4,[illegible]
1898	7,000	35,000					70,500	176,250	440	2,[illegible]
1899	10,000	60,000					80,703	242,109	290	3,[illegible]
1900	5,000	40,000					91,731	332,066	130	1,[illegible]
1901	9,590	67,130					87,424	262,272	423	4,[illegible]
1902	10,000	60,000					67,850	203,550	870	7,[illegible]
1903	10,300	82,400					[3]			
1904	10,500	90,000					[3]		60	[illegible]
1905	12,000	95,500								
1906	21,345	413,750			10,000	$10,000				
1907	28,770	474,350			12,610	14,299				
1908	1,800	10,800	70	595	16,370	44,822			260	4,[illegible]
1909	14,800	140,000	[3]		45,348	205,194				
1910	20,919	195,889	69	552	9,541	63,925				
1911	19,660	153,330	60	500	10,500	8,300				
1912	12,800	133,100							20	[illegible]
1913	13,977	122,937			3,000	2,700				
1914	22,668	159,205			5,000	1,000				
1915	14,841	132,765							319	3,2[illegible]
1916	23,551	315,941	612	7,344	4,060	2,750			562	9,5[illegible]
1917	and tile	290,033	52	960	6,502	4,524			1,211	30,0[illegible]
1918		258,812	220	14,600	2,675	3,850			2,746	109,4[illegible]
1919		369,778	80	1,264	5,011	12,127			[3]	
1920		664,918			3,001	3,762			[3]	
1921		365,853			6,079	7,405			[3]	
1922		[3]			[3]				130	1,0[illegible]
1923		828,048			2,850	10,422				
1924		763,476			2,482	1,124				
1925		938,375			9,300	11,376				
1926		808,779			5,870	7,183				
1927		587,402			6,593	20,516				
1928		505,386			27,189	17,071				
1929		304,326			7,037	6,980				
1930		307,712			10,103	20,063				
1931		248,569			5,505	3,048				
1932		161,001			7,333	4,887				
1933		179,152			4,101	3,496				
1934		192,527			[3]					
1935		218,988			3,782	3,282				
1936		146,730			6,612	6,443				
1937		[3]			5,506	9,712				
1938		[3]			5,244	5,532				
1939		[3]			10,434	17,073				
1940		[3]			6,860	10,349				
1941		[3]			12,372	19,607				

LAMEDA COUNTY, 1890-1943

Pyrites		Salt		Miscellaneous stone,[2] value	Miscellaneous and unapportioned		
Tons	Value	Tons	Value		Amount	Value	Substance
----------	----------	[1]	----------	----------	----------	----------	
----------	----------	----------	----------	----------	----------	----------	
----------	----------	----------	----------	----------	----------	----------	
----------	----------	44,450	$125,125	$73,463	1,265 cu. ft.	$1,000	Building stone.
----------	----------	43,810	114,575	94,372	500 cu. ft.	300	Sandstone.
----------	----------	55,826	122,810	69,405	----------	----------	
----------	----------	61,353	139,830	73,300	----------	----------	
----------	----------	87,800	155,812	73,845	2,000 cu. ft.	750	Sandstone.
----------	----------	78,434	137,088	66,512	----------	----------	
----------	----------	64,718	158,674	107,551	30 tons	180	Magnesite.
4,500	$18,000	114,450	324,136	107,201	13,728 lbs. 190 tons	2,162 1,100	Copper. Magnesite.
14,323	53,301	80,000	160,000	182,295	1,500 lbs. 100 tons	52 500	Lead. Magnesite.
21,811	88,500	76,877	143,605	200,702	10,000 tons	15,000	Lime.
15,043	62,992	52,990	76,340	284,181	----------	----------	
15,503	63,958	49,100	54,200	449,029	----------	----------	
14,000	56,000	68,450	126,838	496,482	500 tons	1,750	Glass sand.
16,482	54,410	54,922	163,127	512,607	1,416 tons	14,400	Asphalt.
13,404	70,782	78,462	108,694	465,653	11,943 tons 3 tons 250 tons	143,376 48 625	Asphalt. Soapstone. Glass sand.
8,015	40,516	104,978	214,808	340,208	18,290 tons ----------	241,475 233,032	Asphalt. Unapportioned, 1900-09, inclusive.
10,938	53,170	131,868	285,217	408,591	18,290 tons 40 tons	197,783 260	Asphalt. Soapstone.
6,340	31,352	121,540	201,542	404,615	----------	----------	
7,267	29,068	126,211	212,150	420,283	----------	----------	
6,029	24,128	129,318	233,388	456,064	5,000 bbls.	5,000	Lime.
9,829	34,696	126,983	292,641	381,135	50 tons 150 tons	250 1,500	Limestone. Magnesite.
11,287	45,148	103,768	220,977	457,381	10 tons ----------	20 1,740	Limestone. Asbestos, chromite, pottery clay.
16,394	65,110	111,206	263,773	403,587	----------	26,657	Limestone, magnesium chloride, magnesite.
[3]	----------	148,846	315,970	413,845	----------	83,141	Lime, limestone, magnesite, magnesium salts, potash, pyrites.
9,113	45,565	130,132	410,345	311,320	----------	19,169	Asbestos, magnesium salts, potash, limestone.
8,978	42,902	157,751	552,178	309,572	----------	16,864	Magnesium salts, manganese, potash.
10,602	55,251	145,368	574,837	620,758	----------	28,354	Magnesium salts, manganese, mineral paint, potash.
13,449	70,669	108,925	370,296	513,641	----------	25,826	Magnesium salts, manganese, mineral paint, potash.
[3]	----------	139,556	434,076	760,422	----------	845,936	Brick, hollow building tile, magnesium, salt, pyrite.
[3]	----------	177,389	585,585	965,465	----------	97,515	Magnesium salts, pyrite.
[3]	----------	189,217	635,653	1,158,886	----------	75,506	Magnesium salts, potash, pyrite.
[3]	----------	180,712	497,692	1,414,398	----------	54,665	Magnesium salts, potash, pyrite.
[3]	----------	202,777.	628,470	1,642,618	----------	71,414	Bromine, magnesium salts, pyrite.
[3]	----------	180,623	366,346	1,538,017	----------	65,506	Magnesium salts, potash, pyrite.
[3]	----------	224,000	611,888	1,267,155	----------	20,330	Pyrite, travertine.
[3]	----------	264,666	1,623,397	1,592,232	321,844 lbs. 104 fine oz. ----------	48,016 55 51,717	Copper. Silver. Mineral paint, pyrite.
[3]	----------	232,808	694,371	1,436,608	41 fine oz. ----------	16 70,567	Silver. Copper, pyrite.
[3]	----------	[3]	----------	1,008,124	----------	1,158,184	Bromine, limestone (shells).
[3]	----------	[3]	----------	813,165	12,545 lbs. 49 fine oz. ----------	790 14 785,282	Copper pyrite, salt. Silver. Limestone (shells), pyrite.
[3]	----------	[3]	----------	649,105	----------	1,097,908	Lime, limestone (shells), mineral paint, pyrite, salt.
[3]	----------	[3]	----------	1,090,371	----------	1,096,735	Clay (pottery), bromine, lime, limestone, pyrite, salt.
----------	----------	[3]	----------	681,555	27,104 lbs.	2,250 1,104,418	Copper. Bromine, lime, limestone, salt.
----------	----------	[3]	----------	1,222,909	----------	1,037,033	Bromine, lime, salt.
----------	----------	[3]	----------	1,361,781	----------	1,104,809	Brick, and tile, bromine, lime, salt.
----------	----------	[3]	----------	1,141,554	----------	1,348,514	Brick and tile, bromine, lime, magnesium salts, salt.
----------	----------	[3]	----------	1,325,914	----------	1,345,600	Brick and tile, bromine, lime, salt.
----------	----------	[3]	----------	1,559,545	----------	2,127,754	Brick and tile, bromine, lime, magnesite,[4] salt.
----------	----------	[3]	----------	2,372,864	----------	2,054,674	Brick and tile, bromine, lime, magnesite,[4] salt.

MINERAL PRODUCTION OF

Year	Brick		Chromite		Pottery clay		Coal		Manganese	
	M	Value	Tons	Value	Tons	Value	Tons	Value	Tons	Value
1942	--------	[3]	--------	----------	8,435	9,668	----------	----------	[3]	---------
1943	--------	[3]	--------	----------	[3]	----------	----------	----------	[3]	---------
Totals	--------	[3]$11,090,212	[3]1,817	$26,693	[3]287,305	$545,940	[3]420,108	$1,266,617	[3]9,351	$195,595
Grand total value	--------	------------	--------	----------	--------	----------	----------	----------	--------	$88,460,88

[1] There was some production of chromite, manganese and salt in Alameda County in the years previous to those her shown but the separate county figures are not available.

[2] Includes crushed rock, macadam, ballast, rubble, rip-rap, sand, gravel.

ιLAMEDA COUNTY, 1890-1943—Continued

Pyrites		Salt		Miscellaneous stone [2] value	Miscellaneous and unapportioned		
Tons	Value	Tons	Value		Amount	Value	Substance
		[3]		3,914,518		2,188,608	Brick and tile, bromine, copper, gypsum,[4] limestone, magnesite[4], manganese ore, salt.
		[3]		3,359,657		1,977,260	Brick and tile, bromine, clay (pottery), gypsum[4], magnesite[4], magnesium salts, salt.
[3]233,697	$1,005,527	[3]4,450,284	$12,336,454	$40,974,461		$21,019,390	

[3] See under 'Unapportioned.'
[4] Precipitated from sea water.

MINERAL PRODUCTION OF ALPINE COUNTY, 1880-1943

Year	Gold, value	Silver, value	Copper		Miscellaneous and unapportioned	
			Pounds	Value	Value	Substance
380	$17,133	$24,146				
381	2,000	2,100				
382	20,000	10,000	70,895	$13,115		
383	10,000	5,000	[1]			
384	5,000	4,000				
385						
396	400					
397						
901	23,568	2,860	8,377	1,319		
902	10,359	3,770				
903	2,701	146				
904	4,827	145				
905	575					
909					$5,465	Unapportioned, 1900:1909.
913	537	4				
914						
919					100	Crushed rock.
920	[2]	[2]			680	Miscellaneous stone.
					160	Gold and silver.
921					925	Miscellaneous stone.
922					2,800	Miscellaneous stone.
923						No commercial production.
924		[2]	[2]		2,552	Lead and miscellaneous stone.
925	[2]	[2]			520	Miscellaneous stone.
926					450	Miscellaneous stone.
927	146	60			5,100	Miscellaneous stone.
928	23	363			174	Lead.
					2,800	Miscellaneous stone.
					5,169	Copper and granite.
929			7,260	1,278	31,735	Miscellaneous stone.
930					2,500	Miscellaneous stone.
931	16	13				
932	647	241			1,100	Miscellaneous stone.
					7	Copper, lead.
933	1,651	1,091	323	21	43	Lead (1,169 lbs.).
					9,918	Unapportioned.
934	3,726	2,371	448	36	58	Lead (1,564 lbs.).
					8,856	Unapportioned.
935	280	162	[2]		8,999	Copper, lead, miscellaneous stone.
936	3,430	4,111			2,000	Miscellaneous stone.
937	13,790	6,923	827	100	413	Lead (6,991 lbs.).
					1,565	Other minerals.
938	35	108			10,980	Miscellaneous stone.
939	1,715	3,047	[2]		2,566	Copper, lead, miscellaneous stone.
940	15,050	825			2,336	Quicksilver, miscellaneous stone.
941	4,760	231			2,005	Miscellaneous stone.
942	595	2			2,500	Other minerals.
943					20,241	Miscellaneous stone, tungsten.
Totals	[2]$143,955	[2]$71,719	[2]88,130	$15,869	$134,717	
Grand total value					$366,260	

[1] "Small production of cement copper" reported in 1883, but record does not show exact figures.
[2] Under 'Unapportioned.'

MINERAL PRODUCTION O

Year	Gold, value	Silver, value	Coal		Copper		Pottery clay		Lime	
			Tons	Value	Pounds	Value	Tons	Value	Barrels	Value
1880	$1,495,053	$1,953	--------	--------	--------	--------	--------	--------	--------	--------
1881	1,450,000	1,500	--------	--------	--------	--------	--------	--------	--------	--------
1882	1,500,000	--------	--------	--------	--------	--------	--------	--------	--------	--------
1883	1,590,000	--------	--------	--------	--------	--------	--------	--------	--------	--------
1884	2,000,000	2,000	--------	--------	--------	--------	--------	--------	--------	--------
1885	2,145,591	3,700	--------	--------	--------	--------	--------	--------	--------	--------
1886	1,874,062	6,136	--------	--------	--------	--------	--------	--------	--------	--------
1887	1,979,956	2,069	--------	--------	--------	--------	--------	--------	--------	--------
1888	1,750,000	3,500	24,404	$36,606	--------	--------	--------	--------	--------	--------
1889	1,560,975	6,398	30,000	45,000	--------	--------	--------	--------	--------	--------
1890	1,459,952	9,357	--------	--------	--------	--------	--------	--------	--------	--------
1891	1,395,962	13,895	21,323	31,984	--------	--------	--------	--------	--------	--------
1892	1,210,383	8,008	--------	--------	--------	--------	--------	--------	--------	--------
1893	1,505,973	5,230	--------	--------	--------	--------	--------	--------	--------	--------
1894	1,331,916	280	15,280	23,020	--------	--------	2,500	$3,000	--------	--------
1895	1,391,929	1,089	21,323	31,985	16,500	$1,650	9,960	10,285	--------	--------
1896	1,523,351	3,767	19,775	29,662	30,000	3,000	8,413	27,825	--------	--------
1897	1,324,472	3,477	20,000	25,000	--------	--------	3,492	9,540	--------	--------
1898	1,806,363	1,742	18,500	29,550	3,000	300	7,197	8,297	--------	--------
1899	1,544,868	6,902	18,500	23,125	--------	--------	10,700	10,900	--------	--------
1900	1,373,788	14,915	27,477	41,215	220,000	34,100	11,500	9,100	--------	--------
1901	1,823,827	7,444	25,000	30,000	52,000	8,190	10,050	7,100	--------	--------
1902	1,629,151	2,686	5,450	10,912	130,000	14,620	12,723	13,728	--------	--------
1903	1,609,744	4,336	--------	--------	10,000	900	22,000	19,460	--------	--------
1904	2,060,574	4,055	--------	--------	14,000	1,400	20,608	10,770	1,700	$1,70
1905	2,445,815	17,930	--------	--------	10,000	1,560	21,775	20,000	1,000	1,50
1906	2,260,373	14,579	--------	--------	8,648	1,669	26,789	28,119	1,000	1,20
1907	2,116,182	13,515	--------	--------	5,300	1,020	12,465	13,992	--------	--------
1908	1,876,175	13,239	--------	--------	53,940	3,440	23,322	25,369	800	96
1909	2,298,785	16,701	--------	--------	288,472	36,641	33,563	32,724	1,200	1,44
1910	2,646,246	20,916	--------	--------	151,484	14,386	39,446	49,339	1,400	1,68
1911	2,832,395	28,899	--------	--------	227,848	28,481	43,352	37,359	1,200	1,50
1912	2,796,194	32,037	--------	--------	175,608	28,975	35,100	36,856	800	1,04
1913	2,901,898	18,097	--------	--------	19,023	2,949	39,678	38,653	1,000	1,20
1914	3,082,002	17,032	5,700	10,062	5,251	694	32,223	33,114	1,540	2,00
1915	3,894,125	20,409	--------	--------	4,185	732	40,156	38,879	1,000	1,20
1916	3,660,550	18,705	[1]	--------	12,349	3,038	29,246	31,106	[1]	--------
1917	3,664,164	21,358	[1]	--------	19,352	5,283	28,970	28,625	--------	--------
1918	3,249,385	29,590	[1]	--------	[1]	--------	13,562	34,346	--------	--------
1919	2,920,492	33,254	[1]	--------	--------	--------	[1]	--------	--------	--------
1920	1,788,793	19,780	[1]	--------	--------	--------	25,719	61,808	--------	--------
1921	2,167,443	35,460	--------	--------	--------	--------	22,124	46,664	--------	--------
1922	2,241,100	32,287	--------	--------	--------	--------	39,572	68,126	--------	--------
1923	1,734,133	15,153	--------	--------	--------	--------	45,887	58,196	--------	--------
1924	2,706,508	18,251	[1]	--------	[1]	--------	64,317	87,444	--------	--------
1925	2,338,101	16,123	[1]	--------	[1]	--------	63,889	95,946	--------	--------

AMADOR COUNTY, 1880-1943

Marble		Brick		Miscellaneous and unapportioned		
Cu. ft.	Value	M	Value	Amount	Value	Substance
--------	--------	--------	--------	--------	--------	
--------	--------	--------	--------	--------	--------	
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25,941	$35,826	--------	--------	--------	--------	
4,864	6,566	--------	--------	--------	--------	
4,389	5,415	--------	--------	--------	--------	
3,864	6,280	--------	--------	--------	--------	
2,850	3,594	--------	--------	--------	--------	
4,582	7,925	--------	--------	--------	--------	
4,103	5,891	--------	--------	--------	$318,422	Unapportioned, 1900-1909.
2,945	4,630	600	$7,000	--------	--------	
6,300	8,016	--------	--------	--------	--------	
3,074	5,379	--------	--------	--------	--------	
4,785	6,558	--------	--------	--------	750	Glass sand.
2,703	3,950	--------	--------	--------	--------	
Totals		--------	--------	--------	--------	
				1,000 tons	1,200	Limestone.
				10 tons	1,000	Asbestos.
[1]70,400	$100,030	2,109	61,369	1,072 lbs.	40	Lead.
				1,000 tons	1,375	Limestone.
				2 tons	200	Asbestos.
		1,429	28,572	41 tons	332	Chromite.
Miscellaneous stone, value				1,000 tons	1,500	Limestone.
				10,100 tons	10,100	Quartz sand.
		2,000	30,000	11,200 cu. ft.	5,600	Sandstone.
				600 tons	6,000	Soapstone.
--------		2,000	20,000	90,000 cu. ft.	45,000	Sandstone.
				6,000 cu. ft.	3,000	Sandstone.
--------		2,500	25,000	700 tons	2,100	Soapstone.
				2,500 cu. ft.	2,500	Sandstone.
				350 tons	2,420	Soapstone.
670		2,000	30,000	1,960 tons	3,556	Quartz.
				877 tons	670	Glass sand.
				--------	11,237	Other minerals.
				16,888 tons	9,855	Glass sand.
				44 lbs.	2	Lead.
--------		2,500	50,000	6,250 tons	2,400	Quartz.
				3,960 cu. ft.	1,500	Sandstone.
				610 tons	2,440	Soapstone.
				523 lbs.	25	Lead.
1,300		4,000	80,000	13,339 tons	16,142	Silica.
				--------	10,950	Other minerals.
				300 tons	3,700	Chromite.
1,300		[1]	--------	4,341 tons	12,802	Silica.
				495 tons	2,475	Soapstone.
		and tile		--------	77,752	Brick, coal, lime, manganese, sandstone.
				65 tons	1,420	Chromite.
1,200		--------	95,345	4,771 tons	20,766	Silica.
				--------	13,033	Coal, lead, manganese, platinum, soapstone, zinc.
				88 tons	4,400	Chromite.
6,500		--------	[1]	13,747 tons	61,724	Silica.
				--------	66,695	Brick, coal, copper, manganese, mineral paint, platinum, soapstone.
				--------	142,523	Clay and clay products.
--------		--------	[1]	8,440 tons	67,366	Silica.
				--------	9,953	Coal, manganese, platinum, sandstone, soapstone.
680		--------	[1]	6,116 tons	36,432	Silica.
				--------	102,707	Brick, coal, mineral paint, platinum, soapstone.
1,125		--------	[1]	1,802 tons	20,646	Silica.
				--------	97,126	Brick and platinum.
7,300		--------	--------	865 tons	5,030	Silica.
				--------	125,220	Other minerals.[3]
28,515		--------	--------	--------	119,877	Other minerals.[4]
3,050		--------	--------	--------	123,612	Other minerals.[5]
31,100		--------	--------	--------	11,003	Other minerals.[6]

MINERAL PRODUCTION OF

Year	Gold, value	Silver, value	Coal		Copper		Pottery clay		Lime	
			Tons	Value	Pounds	Value	Tons	Value	Barrels	Value
1926	$2,167,275	$13,422	[1]		[1]					
1927	1,922,714	11,319	[1]		[1]		118,636	$165,210	[1]	
1928	2,236,922	14,317	[1]		1,402	$202	96,209	116,000		
1929	1,601,861	9,392	[1]		[1]		60,487	88,846		
1930	1,840,191	7,100	[1]		[1]		74,023	103,160		
1931	1,549,073	4,783	[1]		[1]		32,275	57,751		
1932	1,307,760	3,865	[1]		1,454	92	20,284	26,373		
1933	1,945,261	6,471	[1]		13,922	891	18,341	26,016		
1934	2,274,275	10,544	[1]		7,254	580	28,620	50,833		
1935	2,614,235	17,634	[1]		9,641	800	37,876	66,654		
1936	3,402,350	18,096	[1]		31,542	2,902	52,813	91,228		
1937	3,712,835	18,041	[1]		18,579	2,248	66,397	107,212		
1938	3,724,840	14,569	[1]		5,152	505	42,679	73,422		
1939	4,167,030	15,411			3,933	409	37,780	64,147		
1940	4,122,160	16,413			20,643	2,333	34,282	67,164		
1941	3,499,300	16,551			11,941	1,409	70,645	130,997		
1942	1,731,590	7,887	[1]		1,854	224	119,596	254,771		
1943	91,210	1,607			624,336	81,164	105,815	236,396		
Totals	$139,869,641	$775,085	[1]252,732	$368,121	[1]2,209,713	$286,787	1,817,056	$2,722,850	[1]12,640	$15,428

Grand total value, $151,423,540

[1] See under 'Unapportioned.'
[2] Includes crushed-rock, rubble, rip-rap, sand and gravel.
[3] Includes brick and platinum.
[4] Includes brick and soapstone.
[5] Includes brick, coal, copper and lead.
[6] Includes coal, copper, lead and marble.
[7] Includes brick, coal, copper and silica.

AMADOR COUNTY, 1880-1943—Continued

Miscellaneous stone,[2] value	Brick		Miscellaneous and unapportioned		
	M	Value	Amount	Value	Substance
$24,900	[1]	----------	------------	$237,792	Brick and clay (pottery).[5]
			1,267 lbs.	101	Lead.
			------------	8,010	Other minerals.[6]
10,400	[1]	----------	2,491 lbs.	157	Lead.
			------------	97,998	Other minerals.[7]
189,900	----------	[1]	------------	86,838	Brick, coal.
696,500	----------	[1]	------------	101,618	Brick, coal, copper, lead, marble.
388,129	----------	[1]	------------	86,107	Brick, coal, copper, lead, marble, platinum.
491,456	----------	[1]	------------	67,933	Brick, coal, copper, lead, marble.
19,626	----------	[1]	2,981 lbs.	89	Lead.
			------------	42,481	Brick, coal, marble.
----------	----------	[1]	------------	1,178	Lead.
			31,845 lbs.	48,781	Brick, coal, marble, miscellaneous stone.
			------------	223	Lead.
12,115	----------	[1]	6,102 lbs.	51,591	Brick, coal, gems (diamonds).
17,066	----------	[1]	3,271 lbs.	800	Lead.
			------------	48,779	Coal, brick.
30,777	----------	----------	4,296 lbs.	197	Lead.
			------------	71,899	Brick, coal.
[1]	----------	----------	7,004 lbs.	413	Lead.
			------------	77,177	Brick, coal, platinum, miscellaneous stone.
6,027	----------	----------	------------	61,081	Brick, coal, lead, volcanic ash.
3,300	----------	----------	------------	64,276	Brick, lead, platinum, volcanic ash.
28,769	----------	----------	11,459 lbs.	573	Lead.
			------------	47,447	Brick, platinum, volcanic ash.
6,088	----------	----------	13,396 lbs.	764	Lead.
			------------	69,303	Brick, slate, volcanic ash.
17,322	----------	----------	10,559 lbs.	708	Lead.
			------------	79,538	Brick, coal, manganese ore, platinum.
26,426	[1]	----------	1,429 lbs.	107	Lead.
			------------	97,188	Brick, manganese ore, soapstone
[1]$1,961,541	[1]	[1]$427,286	------------	$4,896,771	

MINERAL PRODUCTION OF

Year	Diamonds, value	Gold, value	Mineral water		Platinum	
			Gallons	Value	Ounces	Value
1880		$430,501				
1881		650,000				
1882		650,000				
1883		630,000				
1884		680,000				
1885		672,569				
1886		728,160				
1887		632,902				
1888		550,000				
1889		696,628				
1890		268,977				
1891		304,765				
1892		316,999				
1893		307,351				
1894		473,673				
1895		697,261				
1896		749,316	1,900	$775		
1897		667,025	2,160	900		
1898		514,508	2,685	900		
1899		486,846	2,480	1,240		
1900		485,589	15,000	1,515		
1901		864,978	10,400	1,455		
1902		916,782	14,000	1,500		
1903		1,571,507	13,000	1,550	14	$210
1904		1,932,552	12,600	1,512	66	1,000
1905		2,607,500	15,000	1,500	110	1,770
1906		3,016,747	19,500	1,950	26	475
1907		2,786,840	21,400	2,140		
1908		3,139,398	22,450	2,450		
1909		2,987,079	25,400	1,400		
1910		2,487,791				
1911	$150	2,323,396				
1912		2,346,229				
1913	175	2,269,849	1,000	250		
1914	100	1,700,000	1,200	300	119	381
1915	300	1,545,976	5,000	850	126	3,997
1916	357	1,257,231	3,150	1,125	76	3,472
1917	125	922,271	3,500	1,450	119	9,106
1918	125	645,975	3,900	1,680	114	7,723
1919	[2]	378,297	6,532	2,388	33	5,071
1920	400	467,900	6,400	5,200	fine oz. 42	4,714
1921	331	456,760	2,900	4,100	31	2,432
1922	225	491,201	2,835	2,485	fine oz. 30	3,826
1923		487,393	3,700	3,300	fine oz. 19	2,601
1924		484,530	6,000	4,500	fine oz. 20	2,829
1925		355,289	4,484	2,742	fine oz. 56	9,177
1926	175	287,853			fine oz. 10	954
1927		143,494				
1928		48,432	2,190	1,045		
1929	[8]550	71,917				

ITTE COUNTY, 1880-1943

Silver, value	Miscellaneous stone,[1] value	Miscellaneous and unapportioned		
		Amount	Value	Substance
$1,247	----------	----------	----------	
1,000	----------	----------	----------	
----------	----------	----------	----------	
	----------	----------	----------	
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3,700	----------	----------	----------	
13	----------	----------	----------	
6	----------	----------	----------	
500	----------	----------	----------	
518	----------	----------	----------	
5,815	----------	----------	----------	
229	----------	----------	----------	
610	----------	----------	----------	
5,504	----------	----------	----------	
----------	----------	----------	----------	
8,936	----------	----------	----------	
5,390	----------	----------	----------	
7,885	----------	700 M	$4,200	Brick.
9,317	----------	250 M	1,500	Brick.
		150 tons	3,000	Mineral paint.
5,009	----------	300 M	1,800	Brick.
		900 tons	9,900	Mineral paint.
13,082	----------	600 bbls.	600	Lime.
4,634	----------	900 M	7,200	Brick.
		1,500 bbls.	1,500	Lime.
2,219	----------	800 M	5,000	Brick.
		400 bbls.	750	Lime.
358	----------	1,200 M	7,200	Brick.
		250 bbls.	250	Lime.
		190 tons	250	Limestone.
2,302	----------	670 M	4,020	Brick.
7,134	----------	400 M	3,200	Brick.
10,853	----------	130 M	1,300	Brick.
8,967	----------	----------	----------	
12,708	$7,916	----------	----------	
7,205	32,140	200 M	1,200	Brick.
		----------	107,170	Unapportioned, 1900-1909.
6,429	34,932	645 lbs.	27	Lead.
5,102	78,208	----------	----------	
5,567	51,879	----------	----------	
5,163	258,503	----------	----------	
4,000	50,895	513 lbs.	20	Lead.
3,433	67,143	90 lbs.	4	Lead.
		----------	540	Chromite.
		11 lbs.	2	Copper.
3,332	67,892	1,451 tons	13,940	Chromite.
		----------	9,576	Other minerals.
2,991	89,870	5,746 tons	104,085	Chromite.
		378 lbs.	32	Lead.
		----------	329	Copper, manganese, natural gas.
2,410	77,822	3,325 tons	134,535	Chromite.
		----------	2,765	Manganese and natural gas.
1,911	92,765	----------	1,105	Gems and natural gas.
2,253	[2]	----------	161,095	Natural gas and miscellaneous stone.
1,759	203,900	----------	548	Other minerals.
1,890	220,450	----------	548	Other minerals.
1,756	340,250	----------	6,648	Other minerals.[3]
2,118	138,000	----------	225	Gems.
			9,548	Other minerals.[4]
4,354	156,738	----------	17,878	Other minerals.[5]
2,997	147,604	273 M	4,316	Brick.
		----------	18,046	Other minerals.[6]
371	----------	40 lbs.	5	Copper.
		130 lbs.	8	Lead.
729	556,301	960 M	16,320	Brick.
			17,481	Other minerals.[7]
175	485,187	----------	4,108	Limestone.
			22,382	Other minerals.[9]

MINERAL PRODUCTION O

Year	Diamonds, value	Gold, value	Mineral water		Platinum	
			Gallons	Value	Ounces	Value
1930	$25	$126,858	[2]		[2]	
1931	250	172,383	[2]		[2]	
1932	50	265,589	[2]		[2]	
1933	150	296,159	[2]		[2]	
1934	150	544,000	[2]		[2]	
1935	60	952,632	[2]		[2]	
1936	60	1,202,460	[2]			
1937		1,558,305	[2]		[2]	
1938		1,882,370	[2]		[2]	
1939		2,079,385	[2]		[2]	
1940		2,543,835	[2]		[2]	
1941		2,981,090	[2]		[2]	
1942		2,132,060	[2]		[2]	
1943		525,140	[2]		[2]	
Totals	$3,758	$68,850,503	[2]341,866	$52,202	[2]1,011	$63,16

Grand total value $75,933,6

[1] Includes crushed rock, rubble, rip-rap, sand and gravel.
[2] See under 'Unapportioned.'
[3] Includes diamonds, natural gas, soapstone.
[4] Includes natural gas and soapstone.
[5] Includes brick, copper, gems (diamonds), lead, natural gas, soapstone.
[6] Includes clay (pottery), mineral water, natural gas, soapstone.
[7] Includes copper, gems (diamonds, sapphires), natural gas and soapstone.
[8] Diamonds and precious serpentine.
[9] Includes brick, mineral water, natural gas and soapstone.

ITTE COUNTY, 1880-1943—Continued

Silver, value	Miscellaneous stone,[1] value	Miscellaneous and unapportioned		
		Amount	Value	Substance
$422	$400,239	353 lbs.	$46	Copper.
		----------	12,076	Mineral water, natural gas, platinum, soapstone.
650	300,225	2,108 lbs.	192	Copper.
		----------	9,037	Brick, mineral water, natural gas, platinum, soapstone.
717	191,487	715 lbs.	45	Copper.
		----------	6,624	Lead, mineral water, natural gas, platinum, soapstone.
971	98,992	1,133 lbs.	73	Copper.
		----------	8,316	Lead, mineral water, natural gas, platinum, soapstone.
3,172	80,971	1,805 lbs.	144	Copper.
		----------	9,527	Brick, lead, mineral water, natural gas, soapstone.
4,257	49,653	2,001 lbs.	166	Copper.
		----------	3,244	Brick, lead, mineral water, natural gas, soapstone.
9,796	174,944	5,008 lbs.	460	Copper.
		----------	6,214	Lead, mineral water, natural gas, soapstone.
18,354	219,412	2,545 lbs.	308	Copper.
		----------	2,613	Lead, mineral water, natural gas, platinum, salt, soapstone.
19,669	270,871	----------	4,355	Copper, lead, limestone, mineral water, natural gas, platinum, salt, soapstone.
11,611	123,517	5,838 lbs.	607	Copper.
		11,799 lbs.	555	Lead.
		----------	2,046	Natural gas, mineral water, platinum, salt, soapstone.
14,958	159,483	6,349 lbs.	717	Copper.
		----------	3,823	Mineral water, natural gas, platinum, salt, soapstone.
21,166	166,947	----------	2,669	Clay, copper, lead, mineral water, natural gas, platinum.
14,471	249,337	----------	4,990	Chromite, clay (pottery), copper, lead, mineral water, natural gas, platinum.
5,103	105,281	127,321 lbs.	16,552	Copper.
		15,156 lbs.	1,136	Lead.
		814,458 lbs.	87,961	Zinc.
		----------	14,795	Chromite, mineral water, platinum.
$308,827	$5,749,754	----------	$905,447	

MINERAL PRODUCTION O

Year	Gold, value	Silver, value	Copper		Mineral paint (ochre)		Clay	
			Pounds	Value	Tons	Value	Tons	Value
1880	$320,865	$643	[1]					
1881	800,000	1,200						
1882	670,000							
1883	500,000							
1884	485,000							
1885	527,538	2,558						
1886	639,457	4,926						
1887	640,417	1,477						
1888	580,000	1,500						
1889	592,243	1,071						
1890	618,821	2,499						
1891	738,883	4,860						
1892	794,531	24,441						
1893	1,669,192	122						
1894	2,119,365	5,183	654,866	$64,951	115	$2,530		
1895	1,717,916	77	175,895	16,925				
1896	1,546,398	500	87,557	8,990				
1897	1,439,861	1,745			150	2,400		
1898	1,019,023	3,462	18,400	2,052	100	225		
1899	1,265,564	9,813	165,484	27,586				
1900	1,649,126	80,762	980,934	150,585	400	3,800		
1901	2,024,685	44,687	1,701,389	268,000	125	500		
1902	2,072,939	46,234	2,087,501	251,062	259	778		
1903	1,904,125	68,280	2,246,675	297,263	200	1,000		
1904	1,789,184	65,611	2,592,124	414,399	70	385	100	$1[illegible]
1905	1,836,816	78,859	3,666,810	572,022	379	1,900	40	3[illegible]
1906	1,644,234	74,099	5,082,320	956,315			50	2[illegible]
1907	1,097,974	54,420	3,941,883	609,203				
1908	1,378,511	62,727	4,804,446	555,704	50	250	25	2[illegible]
1909	1,440,511	71,418	5,438,908	690,632			100	5[illegible]
1910	1,147,705	82,866	7,345,321	778,369			30	2[illegible]
1911	1,112,315	67,032	6,190,153	773,769			50	2[illegible]
1912	962,145	70,748	6,125,415	1,010,693			4,281	4,4[illegible]
1913	1,175,208	61,076	5,063,187	784,794	28	190	2,000	4,5[illegible]
1914	1,336,875	60,244	4,468,998	594,377			280	2[illegible]
1915	1,391,134	53,298	4,031,149	705,451	[2]			
1916	1,356,120	83,643	6,099,509	1,500,479				
1917	1,471,442	87,984	7,720,861	2,107,795	[2]			
1918	871,263	84,150	6,762,882	1,670,432				
1919	1,550,574	35,876	2,049,330	381,175				
1920	1,439,745	16,701	2,112,186	388,642				
1921	1,495,758	10,232	[2]					

:ALAVERAS COUNTY, 1880-1943

Mineral water		Limestone		Quartz crystals, value	Miscellaneous and unapportioned		
Gallons	Value	Tons	Value		Amount	Value	Substance
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--	--	--	--	$18,000	717 tons	$3,583	Pyrites.
--	--	--	--	17,500	--	--	
--	--	--	--	--	--	--	
--	--	--	--	--	--	--	
--		--	--	--	3,500 bbls.	5,500	Lime.
					25 tons	375	Chromite.
--	--	3,087	$15,430	10,000	20 tons	300	Chromite.
--	--	3,994	7,635	--	40 tons	280	Chromite.
					13.9 ozs.	250	Platinum.
--	--	6,872	16,955	10,000	--	--	
--	--	14,165	31,446	10,000	--	--	
--	--	4,590	11,987	--	--	50,075	Unapportioned, 1900-1909.
--	--	6,283	16,976	--		--	
10,000	$5,000	3,943	11,733	--	220 lbs.	10	Lead.
7,528	3,764	--	--	--	--	--	
					2,500 lbs.	25	Graphite.
11,500	5,500	2,000	1,400	--	7,006 lbs.	308	Lead.
					--	9,900	Other minerals.
Totals	--	44,934	$119,062				
		Miscellaneous stone³, value					
					650 tons	4,550	Chromite.
15,508	6,517	--	--	--	290 tons	2,618	Fuller's earth.
					30 lbs.	1	Lead.
					9 oz.	294	Platinum.
					163 lbs.	8	Lead.
15,343	5,752	--	$1,900	--	--	4,350	Asbestos, fuller's earth, mineral paint, platinum, silica.
					1,636 tons	12,570	Chromite.
					7,238 lbs.	499	Lead.
18,255	7,025	--	2,503	--	54 oz.	2,453	Platinum.
					--	300	Other minerals.
					1,613 tons	34,245	Chromite.
					6,395 lbs.	550	Lead.
16,985	7,009	--	2,700	--	20 ozs.	1,433	Platinum.
					--	3,922	Clay, fuller's earth, mineral paint, silica, zinc.
					3,830 tons	159,453	Chromite.
10,938	6,069	--	420	--	10 oz.	598	Platinum.
					--	2,067	Asbestos and lead.
					2,019 lbs.	107	Lead.
4,384	1,034	--	600	--	8 oz.	1,076	Platinum.
					--	8,116	Other minerals.
					20 fine oz.	2,002	Platinum.
5,120	512	--	2,400	²	--	30,048	Quartz crystals and lead.
					12 fine oz.	876	Platinum.
2,809	791	--	17,527	--	--	17	Copper and lead.

MINERAL PRODUCTION OF

Year	Gold, value	Silver, value	Copper		Mineral paint (ochre)		Clay	
			Pounds	Value	Tons	Value	Tons	Value
1922	$1,413,465	$11,648	2				2	
1923	1,205,784	7,316	1,598,776	$235,020			2	
1924	853,961	7,463	4,724,441	618,902			2	
1925	652,433	8,324	4,906,650	696,744			2	
1926	576,889	6,229	5,240,927	733,730			2	
1927	219,217	3,982	750,909	98,367			2	
1928	162,372	1,469	150,911	21,731			2	
1929	103,843	3,444	1,200,494	211,287			2	
1930	112,913	1,555	1,857,248	241,442				
1931	152,771	989	184	17				
1932	186,378	763						
1933	442,980	1,927	2,248	144			2	
1934	1,274,862	7,021	144	11			2	
1935	1,607,242	8,218	2				2	
1936	2,113,055	12,242	1,814	167			2	
1937	1,730,435	9,849	9,703	1,174			2	
1938	2,906,225	11,411	25,347	2,487			2	
1939	3,709,895	16,063	2				2	
1940	3,036,390	12,550	7,561	854			2	
1941	2,613,380	10,610	7,076	835			2	
1942	980,140	5,959	531,618	64,326			2	
1943	96,460	26,811	4,187,236	544,341			2	
Totals	$76,984,553	$1,603,065	[2]116,766,470	$19,053,244	[2]1,879	$13,958	[2]6,956	$11,0

Grand total value, $123,650,158.

[1] The Union Mine at Copperopolis was a producer as early as 1861, but there are no detailed, annual figures availab for Calaveras County earlier than here shown.
[2] Under 'Unapportioned.'
[3] Includes crushed rock, sand, gravel.

ALAVERAS COUNTY ,1880-1943—Continued

Mineral water		Miscellaneous stone,[2] value	Quartz crystals, value	Miscellaneous and unapportioned		
Gallons	Value			Amount	Value	Substance
1,914	$639	$35,590	[2]	22 fine oz.	$2,150	Platinum.
				----------	39,391	Clay (pottery), copper, gems.
1,626	569	39,825	[2]	----------	9,605	Clay (pottery), quartz crystals, lead, platinum.
1,400	139	83,250	----------	----------	8,704	Clay (pottery), gems (quartz crystals), lead, platinum, silica (quartz), soapstone.
[2]	----------	78,506	[2]	----------	14,611	Clay (pottery), gems (quartz crystals), lead, mineral water, platinum.
[2]	----------	59,000	[2]	----------	433,924	Cement, clay (pottery), gems (quartz crystals), lead, mineral water, soapstone.
				222 tons	5,063	Chromite.
[2]	----------	[2]	[2]	4,606 lbs.	290	Lead.
				----------	1,281,795	Cement, clay (pottery), gems (quartz crystals), soapstone, miscellaneous stone.
[2]	----------	557,020	[2]	2,817 lbs.	163	Lead.
				----------	2,059,787	Cement, quartz crystals, mineral water, platinum, soapstone.
[2]	----------	360,982	[2]	8,227 lbs.	521	Lead.
				----------	1,896,182	Cement, clay, quartz crystals, mineral water.
[2]	----------	818,507	[2]	1,296 lbs.	65	Lead.
				----------	909,474	Cement, quartz crystals, mineral water.
[2]	----------	185,810	[2]	4,386 lbs.	162	Lead.
				----------	753,805	Cement, quartz crystals, mineral water, platinum.
[2]	----------	49,254	[2]	642 lbs.	19	Lead.
				----------	498,785	Cement, pottery, clay, quartz crystals, mineral water, copper.
[2]	----------	46,436	----------	6,363 lbs.	253	Lead.
				----------	447,259	'Unapportioned.'
[2]	----------	48,339	----------	612 lbs.	23	Lead.
				----------	866,436	Cement, pottery clay, mineral water.
[2]	----------	56,519	----------	----------	640,974	Cement, clay, copper, lead, mineral water.
[2]	----------	7,643	----------	4,755 lbs.	219	Lead.
				----------	1,379,180	Cement, clay, mineral water, platinum, salt.
[2]	----------	76,880	----------	1,816 lbs.	107	Lead.
				----------	1,460,805	Cement, clay, mineral water, slate.
[2]	----------	38,991	----------	1,583 lbs.	73	Lead.
				----------	1,398,751	Cement, clay, mineral water, platinum.
[2]	----------	9,955	----------	----------	1,657,940	Cement, clay, copper, lead, mineral water, platinum, slate.
[2]	----------	14,411	----------	----------	1,169,630	Cement, chromite, clay, lead, mineral water, slate.
----------	----------	29,410	----------	----------	1,739,804	Cement, chromite, clay, platinum, lead, tube-mill pebbles.
[2]	----------	22,823	----------	8,923 lbs.	830	Zinc.
				----------	1,924,157	Cement, chromite, clay, lead.
				107,665 lbs.	8,074	Lead.
----------	----------	95,180	[2]	1,334,625 lbs.	144,140	Zinc.
				----------	1,916,537	Cement, chromite, clay, gems (quartz), manganese ore.
[2]123,310	$50,320	$2,742,381	[2]$65,500	----------	$23,007,014	

MINERAL PRODUCTION OF

Year	Gold and silver, value	Quicksilver		Sandstone	
		Flasks	Value	Cubic feet	Value
1875		700	$58,905		
1876		407	17,908		
1877		466	17,382		
1878					
1879					
1880	[2]$4,908				
1881	3,500				
1882	2,575				
1883	1,000				
1884	1,530				
1885	45,000				
1886	11,617				
1887	7,461				
1888	6,000				
1889	13,626				
1890	2,810				
1891					
1892					
1893	300				
1894				20,000	$7,50
1895		1	40		
1896		58	2,054		
1897		43	1,510		
1898					
1899					
1900		275	12,359		
1901	1,800	235	10,575	88,981	80,08
1902	850	605	26,500	99,395	87,45
1903		510	21,708	146,828	312,50
1904		[3]400	16,526	100,000	290,00
1905		326	12,321	118,954	276,90
1906				88,821	101,80
1907	742	17	648	86,954	78,25
1908	584	21	900	73,284	43,97
1909	[4]	11	545	47,070	24,63
1910	[4]			112,947	56,50
1911	[5]3,118	5	230	101,029	50,02
1912				51,137	15,80
1913				34,927	15,55
1914				16,000	7,30
1915					
1916		285	26,648	[6]	
1917					
1918					
1919					
1920					
1921					
1922	[6]				
1923					
1924					
1925				[6]	
1926					
1927					
1928					
1929		[6]			
1930		[6]			
1931		[6]			
1932	372	[6]			
1933	57	[6]			
1934	480	[6]			
1935	944	[6]			
1936		[6]			
1937		[6]			
1938					
1939	35				4
1940	35	[6]		[6]	
1941		[6]		[6]	
1942		116	21,510	[6]	
1943		[6]			
Totals	$109,344	[6]4,481	$247,869	[6]1,186,327	$1,448,2

Grand total value, $4,062,741.

[1] Includes crushed rock, rubble, rip-rap, sand, gravel.
[2] 1880 to 1890, U. S. Mint reports.
[3] Flasks of 76½ pounds previous to June, 1904; of 75 pounds thence, through 1927; of 76 pounds since Januar 1928.

LUSA COUNTY, 1875-1943

Mineral water		Miscellaneous stone[1], value	Miscellaneous and unapportioned		
Gallons	Value		Amount	Value	Substance
--	--	--	--	--	
--	--	--	--	--	
--	--	--	--	--	
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--	--	--	--	--	
--	--	--	--	--	
--	--	--	40 tons	$400	Salt.
50,090	$12,530	--	--	--	
31,500	1,620	--	8 tons	160	Salt.
21,000	1,050	--	21 tons	439	Salt.
5,000	1,120	--	20 tons	300	Salt.
53,500	12,350	--	20 tons	80	Salt.
92,200	20,220	--	18 tons 270 M	270 2,160	Salt. Brick.
142,305	79,698	--	18 tons	396	Salt.
174,000	85,900	--	18 tons	360	Salt.
156,170	38,051	$1,250	18 tons 300 M	180 1,800	Salt. Brick.
160,000	80,000	--	18 tons	225	Salt.
197,375	49,344	--	150 tons	1,700	Salt.
254,075	51,233	3,500	16 tons	240	Salt.
200,000	88,000	805	10 tons	125	Salt.
150,000	75,000	620	--	104,508	Unapportioned, 1900-1909.
150,000	75,000	16,500	--	--	
136,300	68,150	16,702	--	1,596	Unapportioned.
165,330	39,061	15,300	--	--	
132,720	32,931	--	--	--	
92,000	24,951	--	--	--	
91,480	15,003	1,000	--	--	
[6]	--	550	--	15,604	Mineral paint, mineral water, sandstone.
[6]	--	600	--	15,721	Mineral paint and mineral water.
[6]	--	700	--	15,700	Chromite, mineral paint, mineral water.
--	--	4,900	--	2,400	Other minerals.
--	--	57,488	--	--	
--	--	80,000	--	438	Other minerals.
[6]	--	[6]	--	79,534	Gold, mineral water, silver, miscellaneous stone.
--	--	75,000	--	--	
--	--	75,167	--	2,100	Other minerals.
[6]	--	[6]	--	103,230	Mineral water, sandstone, miscellaneous stone.
--	--	75,167	--	16,027	Unapportioned.
--	--	13,200	--	7	Unapportioned.
--	--	16,500	--	20,000	'Unapportioned.'
--	--	35,000	--	7,570	Petroleum, quicksilver, sulphur.
--	--	45,900	--	4,240	Petroleum, quicksilver, sulphur.
[6]	--	88,680	--	30,680	Mineral water, quicksilver, sulphur.
[6]	--	23,858	--	13,823	Mineral water, quicksilver.
[6]	--	[6]	--	8,839	Mineral water, petroleum, quicksilver, miscellaneous stone.
[6]	--	34,625	--	10,770	Mineral water, petroleum, quicksilver.
--	--	[6]	--	957	Petroleum, quicksilver, miscellaneous stone.
[6]	--	14,206	--	1,277	Mineral water, quicksilver.
[6]	--	[6]	--	15,483	Mineral water, quicksilver, miscellaneous stone.
[6]	--	[6]	--	9,424	Mineral water, miscellaneous stone.
--	--	19,714	--	--	
[6]	--	41,909	--	3,393	Mineral water, quicksilver, sandstone.
[6]	--	[6]	--	41,859	Mineral water, quicksilver, sandstone, miscellaneous stone.
[6]	--	[6]	--	20,200	Mineral water, sandstone, miscellaneous stone.
--	--	69,363	--	24,123	Other minerals.
[6]2,445,045	$851,212	[6]$828,249	--	$577,769	

[4] Included with Lassen County production.
[5] Includes Lassen County production.
[6] See under 'Unapportioned.'

MINERAL PRODUCTION OF

Year	Brick		Coal*		Lime	
	M	Value	Tons	Value	Barrels	Value
1894			35,000	$94,000		
1895			48,635	139,655		
1896	150	$4,500	44,892	118,709		
1897			39,267	105,180		
1898	5,000	25,000	47,000	113,340		
1899			53,013	131,613		
1900			51,248	145,000		
1901			35,000	100,000		
1902	800	11,600	13,960	31,160		
1903	2,600	16,000			5,300	$4,50
1904	9,385	67,495			12,187	10,35
1905	10,979	73,948			20,244	13,92
1906	23,267	169,022				
1907	48,573	403,564			1,413	1,41
1908	55,844	335,737				
1909	41,033	268,122			14,062	15,46
1910	30,284	199,079			17,338	14,75
1911	36,463	271,575			11,872	8,64
1912	32,621	283,718			14,870	12,64
1913	30,411	212,953			150,551	127,96
1914	16,064	129,543	67	268	5,666	4,72
1915	14,915	139,862	[2]			
1916	16,672	148,730	[2]			
1917	and tile	172,653	[2]			
1918	and tile	148,831				
1919		[2]				
1920	13,608	312,398				
1921		[2]				
1922	and tile	307,749				
1923		[2]				
1924	and tile	327,225				
1925		[2]				
1926		[2]				
1927		303,302				
1928	[2]					
1929	[2]					
1930						
1931	[2]					
1932	[2]					
1933	and tile	268,235				
1934	[2]					

;ONTRA COSTA COUNTY, 1894-1943

Limestone		Mineral water		Miscellaneous stone,[1] value	Miscellaneous and unapportioned		
Tons	Value	Gallons	Value		Amount	Value	Substance
-----	-----	-----	-----	-----	-----	-----	Quicksilver, 1875-1877 (inc.)[4]
-----	-----	-----	-----	-----	-----	-----	
-----	-----	7,600	$3,700	$9,000	1,400 tons	$2,200	Pottery clay.
-----	-----	5,000	1,200	-----	-----	-----	
-----	-----	9,300	3,100	-----	-----	-----	
-----	-----	10,000	3,500	-----	-----	-----	
-----	-----	12,000	1,900	-----	-----	-----	
-----	-----	12,000	1,900	-----	-----	-----	
-----	-----	31,200	8,736	-----	31,700 lbs.	3,645	Copper.
18,000	$22,500	78,000	19,500	-----	-----	-----	
-----	-----	78,000	19,000	23,000	-----	-----	
34,800	43,500	[2]	-----	76,120	-----	-----	
-----	-----	-----	-----	75,025	-----	-----	
22,038	43,038	-----	-----	210,250	2,057 tons	21,870	Asphalt.
9,140	18,282	109,400	5,470	236,047	9,500 tons 6,000 tons	123,500 7,500	Asphalt. Pottery clay.
22,556	42,837	199,800	10,590	233,782	17,085 tons -----	222,105 683,392	Asphalt. Unapportioned, 1900-1909.
22,912	37,064	2,500	375	235,655	-----	-----	
68,708	46,208	206,500	10,325	257,503	-----	-----	
25,879	45,291	200,000	10,000	478,162	-----	-----	
26,259	34,976	192,292	4,989	660,405	-----	921,349	Other minerals.
32,657	43,661	364,288	3,643	308,727	-----	658,755	Other minerals.
11,989	14,565	[3]350,000	4,000	397,330	-----	757,748	Asbestos, cement, coal.
[2]	-----	351,724	6,154	363,753	-----	760,423	Cement, clay, coal, limestone.
-----	-----	436,265	8,563	322,507	-----	772,934	Cement and coal.
-----	-----	30,376	3,038	324,884	100 tons -----	300 847,198	Pottery clay. Cement and copper.
-----	-----	[2]	-----	275,309	----- -----	193,340 926,909	Clay and clay products. Cement and mineral water.
-----	-----	-----	-----	432,654	1,743 tons -----	3,319 1,333,682	Pottery clay. Cement and mineral water.
-----	-----	600,300	6,099	415,127	----- -----	198,248 1,003,258	Clay and clay products. Other minerals.
-----	-----	-----	-----	559,915	7,086 tons -----	12,910 1,516,738	Pottery clay. Cement, limestone, mineral water.
-----	-----	-----	-----	629,216	----- -----	281,743 1,761,985	Clay and clay products. Cement, limestone, mineral water.
-----	-----	-----	-----	646,369	-----	1,374,496	Clay (pottery), cement, limestone, mineral water.
-----	-----	-----	-----	708,159	-----	1,836,020	Clay (pottery), and clay products, cement, limestone, mineral water.
[2]	-----	[2]	-----	766,921	----- -----	448,584 1,395,048	Clay and clay products. Cement, limestone and mineral water.
[2]	-----	[2]	-----	816,140	-----	1,053,314	Cement, clay (pottery), limestone and mineral water.
-----	-----	[2]	-----	590,792	-----	1,609,690	Brick and hollow tile, cement, clay, coal, mineral water.
-----	-----	[2]	-----	413,837	7,003 tons -----	6,327 1,407,792	Pottery clay. Brick and hollow tile, cement, mineral water, glass sand.
-----	-----	[2]	-----	398,613	----- 199,186 fine ozs -----	102,036 76,687 1,065,950	Gold. Silver. Brick and hollow tile, cement, clay, mineral water, quicksilver, glass sand.
-----	-----	[2]	-----	315,825	5,368 tons -----	3,813 973,204	Pottery clay. Brick and hollow tile, cement, mineral water, glass sand.
-----	-----	[2]	-----	231,590	-----	782,403	Brick and hollow tile, cement, clay, mineral water, quicksilver, glass sand.
-----	-----	[2]	-----	322,483	-----	641,253	Cement, clay, mineral water, glass sand.
-----	-----	[2]	-----	408,412	-----	1,326,587	Brick and hollow building tile, cement, pottery clay, mineral water, sandstone, silica (glass sand.)

MINERAL PRODUCTION OF

Year	Brick		Coal*		Lime	
	M	Value	Tons	Value	Barrels	Value
1935	------------	368,028	------------	------------	------------	------------
1936	------------	423,887	------------	------------	------------	------------
1937	------------	497,543	------------	------------	------------	------------
1938	------------	483,961	------------	------------	------------	------------
1939	------------	695,508	[2]	------------	------------	------------
1940	------------	[2]	[2]	------------	------------	------------
1941	------------	[2]	[2]	------------	------------	------------
1942	------------	[2]	------------	------------	------------	------------
1943	------------	[2]	------------	------------	------------	------------
Totals	------------	[2]$7,069,768	[2]368,082	$978,925	253,503	$214,392

Grand total value, $68,729,657.

[1] Includes crushed rock, rubble, rip-rap, sand, gravel.
[2] See under 'Unapportioned.'
[3] Estimated.
[4] The Ryne Mine on Mt. Diablo was active in 1875-1877 (inc.) and produced as high as 85 flasks per month at one stage; but total amount not available.
* Coal mining began in the Mount Diablo section of Contra Costa County at least as early as 1861, but there are no segregated county figures available earlier than those here shown. For 1867-1882 (inc.), there are records which indicate for the Mount Diablo field a total of approximately 2,500,000 tons, valued at $14,300,000.

NTRA COSTA COUNTY, 1894-1943—Continued

Limestone		Mineral water		Miscellaneous stone,[1] value	Miscellaneous and unapportioned		
Tons	Value	Gallons	Value		Amount	Value	Substance
-------	----------	[2]	----------	274,237	--------------	719,351	Cement, clay, copper, lead, mineral water, silica.
-------	----------	[2]	----------	427,731	14,245 tons	15,931	Pottery clay.
					--------------	837,582	Cement, mineral water, quicksilver, glass sand.
-------	----------	[2]	----------	518,760	--------------	851,006	Cement, clay, mineral water, quicksilver, silica.
-------	----------	[2]	----------	433,644	--------------	1,198,680	Cement, clay, mineral water, quicksilver, silica.
-------	----------	[2]	----------	320,320	--------------	1,190,303	Cement, clay, coal, gems, mineral water, quicksilver, silica.
-------	----------	[2]	----------	278,477	--------------	1,960,631	Brick and tile, cement, clay, coal, diatomite, mineral water, quicksilver, glass sand.
-------	----------	[2]	----------	769,537	--------------	2,493,554	Brick and tile, cement, mineral water, natural gas, quicksilver, glass sand.
-------	----------	[2]	----------	1,153,454	--------------	2,913,022	Brick and tile, cement, mineral water, quicksilver, silica (glass sand).
-------	----------	[2]	----------	1,171,432	--------------	3,113,389	Brick and hollow tile, cement, clay, (pottery), mineral water, natural gas, quicksilver, silica (glass sand).
294,938	$391,922	[2]3,286,545	$135,782	$17,527,164	--------------	$42,411,704	

MINERAL PRODUCTION OF DEL NORTE COUNTY, 1880-1943

Year	Gold, value	Silver, value	Platinum		Miscel-laneous stone[1], value	Miscellaneous and unapportioned		
			Ounces	Value		Amount	Value	Substance
1880	$215,403	$300						[2]
1881	60,000							
1882	80,000							
1883	135,000							
1884	100,000							
1885	39,390	9						
1886	76,189							
1887								
1888								
1889	21,800							
1890	900							
1891	5,586							
1892	4,102							
1893	10,352							
1894	8,000							
1895	8,250							
1896	24,150							
1897	16,710							
1898	9,057							
1899	4,450							
1900	3,483							
1901	10,612							
1902	5,450							
1903	7,183							
1904	7,399		1.5	$18				
1905	10,590		1.5	22				
1906	5,945	33						
1807	878	3						
1908	3,488	19				74,787 lbs.	$9,984	Copper.
1909	1,610	52				24,449 lbs.	13,085 20,000	Copper. Unapportioned, 1900-09
1910	2,388	62				26,670 lbs.	3,395	Copper.
1911	1,743	7						
1912	3,940	10						
1913	2,498	16						
1914	2,035	9	14	643	$3,250			
1915	1,018	6			3,500			
1916	405	2	2	73	1,685		267	Chromite and copper
1917	1,373	8	10	853	2,700	3,275 tons	97,255 2,151	Chromite. Other minerals.
1918	565	4	1	97	8,000	7,143 tons	360,485 2,584	Chromite. Other minerals.
1919	867	6			6,300		67	Other minerals.
1920					9,000		2,781	Chromite and copper.
1921	[3]	[3]	[3]		5,580		449	Gold, platinum, silver.
1922	[3]	[3]	[3]		5,500		761	Gold, platinum, silver.
1923	1,778	9	[3]		31,368		872	Copper and platinum.
1924	325		[3]		721,720		220	Unapportioned.
1925	681	1			269,650		250	Other minerals.
1926	1,078	4	10	1,132	68,250			
1927	384	1			53,350		240	Other minerals.
1928	277	1			381,080			
1929		3			83,380	5,002 lbs.	880	Copper.
1930	279	1			275,227		523	'Unapportioned.'
1931	1,372	1			36,702			
1932	2,195	2			23,416		188	'Unapportioned.'
1933	1,933	3	[3]		[3]		1,126	Platinum, miscellaneous stone.
1934	6,078	13	[3]		73,883		24	'Unapportioned.'
1935	4,798	3			41,788		4,529	Gold, silver, platinum.
1936	[3]	[3]	[3]		12,247		28,014	Chromite, miscellaneou stone.
1937	2,625	8			[3]			
1938	700	1			15,296			
1939	4,410	15	[3]		7,250		1,426	Chromite, platinum.
1940	1,750	3			[3]		22,936	Chromite, miscellaneou stone.
1941	1,365	2	[3]		18,250		92,636	Chromite, platinum.
1942	175	2			18,709		382,367	Unapportioned.
1943					42,537		567,127	Chromite, quicksilver.
Totals	[3]$925,102	[3]$619	[3]40	$2,838	$2,119,618		$1,613,622	

Grand total value, $4,661,799.

[1] Includes crushed rock, rubble, rip-rap, sand, gravel.
[2] Gold, copper and chromite were produced in Del Norte County earlier than the years shown, but the amounts ar not separable by counties. Some quicksilver was obtained in the 50's but there is no record of amount.
[3] See under 'Unapportioned.'

MINERAL PRODUCTION O[illegible]

Year	Gold, value	Silver, value	Copper		Lime	
			Pounds	Value	Tons	Value
1880	$389,383	$208				
1881	550,000	900				
1882	600,000					
1883	530,000					
1884	575,000	16,000				
1885	35,000					
1886	619,992	1,822				
1887	706,871	365				
1888	650,000	500				
1889	427,638	408				
1890	204,583	275				
1891	173,279	359				
1892	198,321					
1893	294,610	1,220				
1894	366,707	356			1,600	$8,0[illegible]
1895	700,101	448			4,560	28,5[illegible]
1896	812,289	534			706	4,1[illegible]
1897	674,626	886			2,160	6,7[illegible]
1898	501,966	4,174			538	3,3[illegible]
1899	404,497	8,414			1,270	7,9[illegible]
1900	368,541	25,129	3,125	$500	1,200	6,0[illegible]
1901	292,036	5,977			1,760	11,0[illegible]
1902	335,031	52	2,128	319	3,936	16,1[illegible]
1903	277,304				896	7,0[illegible]
1904	474,994				2,058	7,0[illegible]
1905	384,735	2,525	160,000	24,960	1,482	6,9[illegible]
1906	431,746	2,690			3,075	21,1[illegible]
1907	319,177	2,301		122	1,782	16,1[illegible]
1908	342,033	5,504	603	83	2,547	20,1[illegible]
1909	238,284	1,299			2,212	14,5[illegible]
1910	171,304	967			1,808	9,9[illegible]
1911	133,967	1,010			2,414	12,3[illegible]
1912	105,565	843			2,244	11,2[illegible]
1913	62,688	250	696	107		
1914	133,886	654			2,240	12,0[illegible]
1915	401,288	1,353	417	73	2,546	12,8[illegible]
1916	361,821	1,496	[3]		[3]	
1917	24,758	85	18,982	5,182	[3]	
1918	28,352	722	22,259	5,498		
1919	30,121	279				
1920	13,379	155				
1921	34,109	301				
1922	47,340	376				
1923	30,264	185				
1924	28,207	153				
1925	40,212	238				
1926	91,789	472			[3]	
1927	82,254	383	[3]			
1928	122,017	697	1,074	155		
1929	57,680	236	[3]		[3]	
1930	78,019	250			[3]	
1931	85,322	283	[3]		[3]	
1932	182,043	438	850	54	[3]	
1933	540,989	1,458	2,755	176	[3]	
1934	1,380,710	6,035	4,312	345	8,250	85,9[illegible]

L DORADO COUNTY, 1880-1943—Continued

Limestone		Slate		Miscellaneous stone[2], value	Miscellaneous and unapportioned		
Tons	Value	Squares	Value		Amount	Value	Substance
[1]	------	------	------	------	------	------	
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------	------	------	------	------	------	------	
------	------	1,800	$11,700	------	------	------	
------	------	1,350	9,450	------	------	------	
------	------	500	2,500	------	------	------	
500	$250	400	2,800	------	------	------	
------	------	400	2,800	------	------	------	
------	------	600	4,500	------	------	------	
------	------	3,500	26,250	------	------	$251,820	Unapportioned, 1900-09.
------	------	5,100	38,250	------	------	------	
------	------	4,000	30,000	------	------	------	
------	------	------	------	------	------	------	
------	------	6,000	50,000	------	10 tons	162	Asbestos.
1,050	5,775	4,000	40,000	------	112 tons	2,625	Asbestos.
------	------	10,000	100,000	------	20 tons	1,000	Asbestos.
5,394	15,318	7,000	60,000	------	------	------	
------	------	6,000	50,000	$1,600	200 M	8,000	Paving blocks.
------	------	6,961	45,660	530	3,763 tons	5,645	Sand (glass).
------	------	1,000	8,000	2,616	1,200 tons	1,800	Sand (glass).
1,000	1,000	------	------	5,465	3,701 lbs.	167	Lead.
------	------	------	------	4,375	------	------	
------	------	------	------	4,678	------	------	
------	------	------	------	2,600	90 lbs.	4	Lead.
------	------	[3]	------	7,500	------	5,250	Slate and soapstone.
[3]	------	------	------	12,000	5,260 tons ------ 886 tons ------	72,560 19,613 1,717 1,480	Chromite. Lime and limestone. Silica. Copper and soapstone
[3]	------	------	------	6,200	8,319 tons ------ 2,684 tons ------	167,950 104,851 4,506 70	Chromite. Lime and limestone. Silica. Other minerals.
96,673	218,120	------	------	20,500	11,936 tons ------	674,856 11,236	Chromite. Pyrites, silica, soapstone.
41,025	112,423	------	------	1,700	378 tons 1,600 tons ------	6,510 13,950 1,169	Chromite. Soapstone and talc. Other minerals.
	139,873	------	------	5,500	2,640 tons ------	18,200 9,325	Soapstone. Other minerals.
15,296	66,143	------	------	2,750	1,652 tons	9,453	Talc.
42,200	113,700	------	------	4,250	------	18,850	Slate and soapstone.
95,274	163,987	------	------	5,900	2,670 tons	15,729	Soapstone.
112,156	322,955	------	------	2,538	1,498 tons ------	8,988 32,691	Talc. Copper and lime.
228,293	297,127	------	------	10,305	------	4,946	Lime and silica.
59,386	186,702	[3]	------	17,510	------	5,613	Lime, silica, slate.
96,733	146,506	[3]	------	500	------	15,792	Copper, gems, silica, soapstone, slate.
57,012	158,252	[3]	------	17,455	365 tons	8,855 21,995	Soapstone. Lead, silica, slate.
71,033	199,989	[3]	------	25,665	------	83,930	Copper, lime, silica, slate, soapstone.
88,869	205,225	[3]	------	96,599	------	113,105	Lead, lime, silica, slate, soapstone.
79,798	207,594	[3]	------	37,494	------	107,242	Chromite, copper, lead, lime, silica, slate, soapstone.
105,094	207,241	[3]	------	[3]	------	97,126	Lead, lime, platinum, silica, slate, soapstone, miscellaneous stone, tungsten ore.
120,026	208,049	[3]	------	7,551	------	90,586	Lead, lime, slate, soapstone.
112,237	152,422	[3]	------	7,400	------	18,405	Lead, silica (quartz), slate, soapstone.

MINERAL PRODUCTION OF

Year	Gold, value	Silver, value	Copper		Lime	
			Pounds	Value	Barrels	Value
1935	$1,803,368	$5,943	12,391	$1,028	[3]	
1936	1,988,735	9,063	21,661	1,993	[3]	
1937	1,719,795	8,238	65,353	7,908	[3]	[3]
1938	1,484,805	5,717	40,535	3,972	[3]	
1939	2,520,105	8,627	10,910	1,135	[3]	
1940	1,341,585	3,799	1,630	184	[3]	
1941	1,577,630	4,216	957	113	[3]	
1942	636,790	1,624	[3]			
1943	5,040	303	20,282	2,637		
Totals	$30,224,641	$149,313	[3]390,917	$56,544	[3]51,284	$329,38

Grand total value, $42,906,813.

[1] In addition to the segregated figures herein given, a large tonnage of limestone is annually shipped from El Dorado County for use in cement manufacture, and whose value is included in the state total for cement.
[2] Includes crushed rock, rubble, rip-rap, sand, gravel.
[3] See under 'Unapportioned.'
[4] There was a small production of quicksilver in the 60's, but no record of amounts.

. DORADO COUNTY, 1880-1943—Continued

Limestone		Slate		Miscel-laneous stone[2], value	Miscellaneous and unapportioned		
Tons	Value	Squares	Value		Amount	Value	Substance
151,814	$298,867	[3]	------------	$46,886	------------	$232,907	Lead, lime, mineral water, silica (quartz), slate, soapstone.
159,134	348,055	[3]	------------	77,778	------------	371,356	Chromite, lead, lime, mineral water, platinum, slate, soapstone.
227,721	448,130	[3]	------------	20,784	[3]	402,762	Chromite, lime, mineral water, platinum, slate, soapstone.
135,142	304,420	[3]	------------	64,202	------------	343,983	Chromite, lead, lime, mineral water, soapstone, slate.
146,625	320,212	[3]	------------	16,422	4,766 lbs.	224	Lead.
					------------	410,954	Chromite, lime, platinum, mineral water, slate, soapstone.
261,713	308,708	[3]	------------	12,947	------------	427,272	Chromite, lead, lime, slate, soapstone.
75,631	152,390	[3]	------------	9,241	------------	580,574	Chromite, lead, lime, slate, soapstone.
147,469	247,522	[3]	------------	15,396	------------	418,918	Chromite, copper, lead, platinum, slate, soapstone.
[3]	------------	------------	------------	[3]	------------	296,469	Chromite, lead, limestone, slate, soapstone, miscellaneous stone.
773,387	$5,586,995	[3]58,611	$481,910	[3]$564,837	------------	$5,513,191	

MINERAL PRODUCTION O

Year	Gold, value	Silver, value	Copper		Petroleum		Brick		Miscellaneous stone[1], Value
			Pounds	Value	Barrels	Value	M	Value	
1880	$143,433								
1881	90,000								
1882	80,000								
1883	100,000								
1884	80,000								
1885	74,500	$2,456							
1886	151,186	2,701							
1887	205,242	274							
1888	200,000	2,800							
1889	185,988	4,629							
1890	49,951	1,816							
1891	82,607	10,396							
1892	[2]112,981	[2]6							
1893	7,118								
1894	8,202								
1895	47,249								
1896	28,235	100			14,119	$56,750			
1897	43,144				70,140	70,840			
1898	27,557				154,000	154,000	2,500	$18,000	
1899	18,142				439,372	439,372	5,500	38,500	
1900	22,346	479			547,960	547,960	4,250	35,062	
1901	21,462		1,159,672	$182,648	525,433	236,444	5,000	35,000	
1902	54,427		3,000,000	345,000	571,233	199,931	6,000	45,000	
1903	21,538	111			2,214,160	730,673	8,000	68,000	$11,03
1904	7,809	4	2,500	319	5,114,958	1,520,847	4,800	32,400	
1905	40,037	9,187	1,440,000	224,640	8,890,000	2,400,300	9,000	60,000	
1906	8,493	83	440,000	88,000	8,402,000	1,974,470	8,000	64,000	
1907	2,401	26	250,000	50,000	9,050,300	3,620,120	9,230	57,350	10,50
1908	1,054	11			10,725,389	5,898,964	13,220	106,960	16,90
1909	17,539	8,503	876,837	111,341	15,406,619	9,243,971	7,950	49,375	28,40
1910	3,373	2,980	486,725	61,999	18,651,470	9,277,241	9,533	76,267	58,08
1911	17,441	81			19,499,611	9,344,085	4,500	28,500	318,9
1912	6,094	23			19,510,932	8,487,255	5,000	40,000	307,1
1913	2,846	15			18,956,965	7,927,736	5,500	44,000	416,4
1914	10,231	31			15,952,190	7,210,389	4,500	36,000	237,9
1915	4,151	246	65,903	11,533	14,021,025	7,641,459	4,750	33,250	193,7
1916	693	69	29,173	7,177	14,594,246	7,530,631	[3]		95,8
1917	5,745	289	40,662	11,101	16,259,797	13,414,333	[3]		136,7
1918	4,795	37			16,068,919	19,138,083	and tile	89,156	244,6
1919	5,540	67			16,091,037	20,805,711	[3]		241,2
1920	7,793	227			15,375,454	22,801,798	12,517	196,756	535,5
1921	13,085	75			12,161,565	18,643,679	[3]		486,0
1922	10,442	87			9,265,529	9,895,582		220,737	600,3
1923	18,519	128			5,061,542	3,593,695	[3]		863,0
1924	32,978	190			10,156,405	11,801,743		95,104	451,5
1925	25,056	151			7,773,665	8,503,390	[3]		457,3
1926	8,595	52			7,340,102	5,982,183		87,493	388,5
1927	17,406	77			7,202,284	5,977,176		89,145	1,118,

ESNO COUNTY, 1880-1943

Mineral water		Magnesite		Natural gas		Miscellaneous and unapportioned		
llons	Value	Tons	Value	M cu. ft.	Value	Amount	Value	Substance
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-----	-------	-------	-------	-------	-------	216 tons 500 tons	$700 4,000	Coal. Gypsum.
-----	-------					600 tons	4,800	Gypsum.
1,200	$400	-------	-------	-------	-------	50 tons	400	Gypsum.
1,886	350	-------	-------	-------	-------	-------	-------	
2,000	900	-------	-------	-------	-------	100 tons	600	Gypsum.
2,000	900	-------	-------	-------	-------	16 tons	320	Asphalt.
5,000	4,000	-------	-------	-------	-------	-------	268,534	Unapportioned, 1900-1909
5,142	5,142	-------	-------	-------	-------	-------	-------	
5,000	4,500	-------	-------	-------	-------	-------	-------	
7,200	7,200	-------	-------	-------	-------	839 tons	10,068	Asphalt.
4,800	2,400	38	$120	-------	-------	579 tons	6,948	Asphalt.
-----	-------	-------	-------	-------	-------	-------	-------	
-----	-------	-------	-------	-------	-------	-------	-------	
-----	-------	-------	-------	-------	-------	-------	-------	
-----	-------	-------	-------	-------	-------	500 tons 9,000 tons	5,500 26,000	Asphalt. Clay.
-----	-------	850	8,500	-------	-------	400 tons	4,400	Asphalt.
-----	-------	1,400	22,400	-------	-------	200 tons -------	2,600 750	Asphalt. Gems.
-----	-------	220	2,195	-------	-------	-------	250	Gems.
-----	-------	2,000	20,000	200,000	$21,380	50 tons ------- 336 flasks	950 700 14,125	Chromite. Gems. Quicksilver.
-----	-------	1,135	9,080	236,100	23,610	375 flasks	15,086	Quicksilver.
-----	-------	-------	-------	250,000	15,000	148 flasks	7,259	Quicksilver.
-----	-------	-------	-------	2,894,834	253,906	1,300 tons -------	13,600 450	Chromite. Other minerals.
[3]	-------	5,829	49,082	2,346,917	163,941	9,060 tons 11,000 cu.ft. 668 lbs. -------	151,824 25,000 46 36,900	Chromite. Granite. Lead. Brick, fuller's earth, mineral water.
[3]	-------	6,077	57,422	4,097,626	347,501	6,289 tons ------- -------	109,292 31,500 44,150	Chromite. Granite. Asbestos, brick, mineral water, quicksilver.
-----	-------	1,795	16,151	5,009,327	267,123	2,314 tons ------- 35 flasks	86,181 26,800 3,652	Chromite. Granite. Quicksilver.
-----	-------	600	5,950	5,191,287	411,356	------- -------	34,500 140,128	Granite. Chromite and brick.
-----	-------	906	8,725	3,721,313	201,865	------- -------	49,600 17,000	Granite. Other minerals.
-----	-------	945	9,540	1,886,081	190,181	------- ------- -------	125,276 28,610 2,000	Clay and clay products Granite. Other minerals.
-----	-------	-------	-------	1,694,090	89,277	------- ------- -------	28,600 8,360 217,880	Granite. Other minerals. Clay and clay products.
-----	-------	-------	-------	1,599,354	122,702	------- -------	64,920 2,400	Granite. Other minerals.
-----	-------	-------	-------	1,430,708	102,286	------- -------	60,447 3,600	Granite. Other minerals.
-----	-------	-------	-------	1,515,889	116,711	------- -------	63,580 98,801	Granite. Clay and clay products, mineral water.
[3]	-------	-------	-------	1.920,489	153,726	17,880 cu.ft. -------	78,624 800	Granite. Other minerals.
-----	-------	-------	-------	1,682,652	148,227	17,186 cu.ft. -------	74,424 2,000	Granite. Other minerals.

MINERAL PRODUCTION (

Year	Gold, value	Silver, value	Copper		Petroleum		Brick		Miscel laneou stone[1] value
			Pounds	Value	Barrels	Value	M	Value	
1928	$15,455	$75	[3]	----------	4,611,440	$3,524,985	[3]	----------	$362,2
1929	13,575	79	[3]	----------	3,498,107	1,781,586	[3]	----------	301,8
1930	5,916	21	[3]	----------	3,362,902	1,910,128	[3]	----------	[3]
1931	6,512	15	[3]	----------	2,991,976	1,649,476	[3]	----------	202,7
1932	12,445	32	[3]	----------	3,665,641	2,038,096	[3]	----------	116,4
1933	19,459	48	[3]	----------	4,516,246	2,586,906	[3]	----------	59,8
1934	24,066	87	[3]	----------	6,607,661	4,295,980	[3]	----------	[3]
1935	20,645	119	[3]	----------	27,679,545	26,047,611	[3]	----------	161,7
1936	15,225	74	[3]	----------	30,035,864	36,317,189	[3]	----------	175,1
1937	8,540	43	[3]	----------	29,091,322	36,521,804	[3]	----------	187,3
1938	10,955	35	[3]	----------	20,784,106	26,201,849	----------	----------	224,8
1939	16,100	58	[3]	----------	15,411,056	18,077,169	----------	----------	293,0
1940	34,400	164	[3]	----------	17,377,685	18,562,902	----------	----------	197,4
1941	214,060	694	[3]	----------	20,302,492	19,560,723	[3]	----------	264,0
1942	40,810	143	----------	----------	23,959,303	21,206,580	[3]	----------	391,8
1943	1,260	3	----------	----------	37,869,219	37,779,881	----------	----------	257,3
	$2,586,847	$50,160	[3],7791,472	$1,093,758	557,832,986	$483,133,676	----------	$1,645,965	[3]$10,413

Grand total value, $541,163,821.

[1] Includes crushed rock, rubble, rip-rap, sand, gravel.
[2] To end of 1892, includes Madera County, which was created March 11, 1893.
[3] See under 'Unapportioned.'
[4] Brick and hollow building tile, copper, gems, mineral water, pumice, quicksilver.
[5] Brick and hollow building tile, copper, diatomite, gems, mineral water, volcanic ash.
[6] Brick and hollow building tile, diatomite, granite, gypsum, mineral water, volcanic ash, miscellaneous stone.
[7] Brick and hollow building tile, chromite, diatomite, gems, granite, gypsum, marl, mineral water, quicksil volcanic ash.
[8] Brick and hollow building tile, diatomite, gems, granite, gypsum, marl, mineral water, quicksilver, volcanic a
[9] Brick and hollow building tile, pottery clay, diatomite, granite, gypsum, marl.
[10] Brick and hollow building tile, clay (pottery), copper, diatomite, gems, granite, gypsum, limestone (mar miscellaneous stone.
[11] Brick and hollow tile, chromite, copper, diatomite, granite, limestone, quicksilver.
[12] Brick and hollow tile, chromite, clay (oil well drilling mud), copper, feldspar, gems, granite, gypsum, limesto quartz.
[13] Brick and hollow tile, chromite, clay (oil well drilling mud), copper, feldspar, granite, gypsum, limestone, qui silver.
[14] Brick and hollow tile, chromite, pottery clay, feldspar, gems, granite, gypsum, limestone, mineral water, qui silver, tungsten ore.
[15] Brick, pottery clay, feldspar, gems, mineral water, gypsum, granite, limestone, quicksilver, tungsten ore.
[16] Brick and hollow tile, chromite, pottery clay, coal, feldspar, granite, gypsum, quicksilver, tungsten ore.
[17] Brick and hollow tile, chromite, copper, gems, granite, gypsum, platinum, tungsten ore.
[18] Brick and hollow tile, chromite, clay, feldspar, granite, quicksilver.

ESNO COUNTY, 1880-1943—Continued

ineral water		Magnesite		Natural gas		Miscellaneous and unapportioned		
llons	Value	Tons	Value	M cu. ft.	Value	Amount	Value	Substance
[3]	--------	--------	----------	1,422,366	$151,061	1,376 cu.ft.	$80,050	Granite.
						-------------	93,400	Other minerals.[4]
[3]	--------	--------	----------	1,006,110	190,598	-------------	28,000	Granite.
						10 flasks	1,190	Quicksilver.
						-------------	13,600	Other minerals.[5]
[3]	--------	--------	----------	393,337	26,108	174 flasks	13,418	Quicksilver.
						-------------	368,882	Other minerals.[6]
[3]	--------	--------	----------	5,591,304	253,937	-------------	125,645	Other minerals.[7]
[3]	--------	--------	----------	25,476,752	1,520,285	-------------	57,039	Other minerals.[8]
[3]	--------	--------	----------	18,807,454	1,191,237	34 flasks	1,541	Quicksilver.
						-------------	42,549	Other minerals.[9]
[3]	--------	--------	----------	19,680,080	1,235,707	30 flasks	1,208	Quicksilver.
						-------------	215,759	Other minerals.[10]
----	--------	--------	----------	63,579,904	3;687,049	6,633 tons	19,899	Gypsum.
						-------------	79,603	Other minerals.[11]
----	--------	--------	----------	60,983,263	3,582,394	71 flasks	5,362	Quicksilver.
						-------------	149,730	Other minerals.[12]
----	--------	--------	----------	67,274,419	.4,308,280	-------------	152,745	Other minerals.[13]
[3]	--------	--------	----------	58,337,848	3,626,724	-------------	95,086	Other minerals.[14]
----	--------	--------	----------	54,485,085	2,799,981	-------------	88,907	Other minerals.[15]
----	--------	--------	----------	61,400,088	3,139,902	-------------	169,196	Other minerals.[16]
----	--------	--------	----------	68,694,072	3,468,495	183 flasks	31,909	Quicksilver.
						-------------	211,142	Other minerals.[17]
----	--------	--------	----------	59,828,203	2,946,323	2,236 units	50,260	Tungsten ore.
						-------------	154,512	Other minerals[18]
----	--------	--------	----------	48,944,169	2,793,749	32 flasks	5,980	Quicksilver.
						2,888 units	79,165	Tungsten ore.
						-------------	122,247	Chromite, feldspar, gems, granite.
,288	$25,792	21,795	$209,165	651,581,121	$37,541,622	-------------	$4,462,899	

MINERAL PRODUCTION OF GLENN COUNTY, 1893-1943

Year	Amount	Value	Substance
1893 and previous	3,319 long tons	$49,700	Chromite.
1909	140,000 tons	49,000	Macadam.
1910	378,000 tons	34,020	Rubble.
1911	421,775 tons	51,430	Sand and gravel.
1912	543,675 tons	32,950	Sand and gravel.
1913	416,640 tons	27,776	Sand and gravel.
1914		30,553	Miscellaneous stone.
1915	746 lbs.	131	Copper.
		46,526	Miscellaneous stone.
		10	Other minerals.
1916		41,180	Miscellaneous stone.
		39,982	Other minerals.
1917	879 tons	21,474	Chromite.
	369 tons	9,721	Manganese.
		33,260	Miscellaneous stone.
		817	Other minerals.
1918	1,129 tons	57,263	Chromite.
		32,436	Miscellaneous stone.
1919		58,137	Miscellaneous stone.
		1,500	Other minerals.
1920		134,707	Miscellaneous stone.
1921		103,197	Miscellaneous stone.
1922		91,250	Miscellaneous stone.
1923		113,282	Miscellaneous stone.
1924		41,550	Miscellaneous stone.
1925		92,288	Miscellaneous stone.
1926		58,391	Miscellaneous stone.
1927		63,869	Miscellaneous stone.
1928		101,889	Miscellaneous stone.
1929		81,516	Miscellaneous stone.
1930		61,179	Miscellaneous stone.
1931		47,462	Miscellaneous stone.
1932		8,714	Miscellaneous stone.
1933		11,690	Miscellaneous stone.
1934		30,608	Miscellaneous stone.
1935		2	Gold.
		41,285	Miscellaneous stone.
1936		134,466	Miscellaneous stone.
1937		136,368	Miscellaneous stone.
1938		60,138	Miscellaneous stone.
1939		54,519	Miscellaneous stone.
1940		16,891	Miscellaneous stone.
1941		33,204	Miscellaneous stone.
1942		504,755	Unapportioned.
1943		68,113	Miscellaneous stone.
		846,917	Other minerals.
Total		$3,556,188	

MINERAL PRODUCTION OF

Year	Gold, value	Silver, value	Mineral water		Brick	
			Gallons	Value	M	Value
1880	$153,940	$80	----	----	----	----
1881	75,000	300	----	----	----	----
1882	100,000	----	----	----	----	----
1883	80,000	----	----	----	----	----
1884	115,000	----	----	----	----	----
1885	29,730	----	----	----	----	----
1886	83,591	----	----	----	----	----
1887	111,532	----	----	----	----	----
1888	100,000	----	----	----	----	----
1889	143,701	274	----	----	----	----
1890	93,612	82	----	----	----	----
1891	99,329	19	----	----	----	----
1892	87,515	----	----	----	----	----
1893	66,354	----	----	----	----	----
1894	41,326	14	20,000	$7,200	----	----
1895	92,635	----	24,000	12,000	----	----
1896	65,093	----	15,000	10,000	----	----
1897	94,992	57	10,000	2,000	----	----
1898	57,512	----	----	----	300	$2,50
1899	65,059	----	6,000	1,500	410	3,87
1900	109,444	[1]136	6,000	2,000	795	7,10
1901	98,487	[1]59	7,825	2,000	1,005	7,81
1902	60,015	----	10,000	2,500	2,170	17,04
1903	38,509	----	----	----	1,060	10,44
1904	62,061	----	----	----	2,565	21,35
1905	45,824	----	----	----	800	7,60
1906	48,295	240	----	----	915	8,69
1907	40,109	214	----	----	140	1,40
1908	33,066	325	----	----	760	8,58
1909	25,690	94	----	----	1,310	9,75
1910	35,289	150	----	----	476	4,04
1911	34,966	169	----	----	357	2,88
1912	31,271	150	----	----	772	6,41
1913	25,611	132	----	----	500	4,15
1914	18,686	57	----	----	607	6,12
1915	15,947	62	2,000	500	463	5,56
1916	21,279	55	3,000	750	[2]	----
1917	23,086	95	[2]	----	[2]	----
1918	8,028	72	[2]	----	[2]	----
1919	16,260	134	[2]	----	[2]	----
1920	2,538	19	[2]	----	[2]	----
1921	2,054	37	----	----	----	----
1922	1,330	10	[2]	----	[2]	----
1923	2,260	12	[2]	----	[2]	----
1924	1,269	7	[2]	----	[2]	----
1925	13,142	62	----	----	----	----
1926	1,243	6	----	----	----	----
1927	1,729	14	----	----	----	----

HUMBOLDT COUNTY, 1880-1943

Miscellaneous stone[3], value	Natural gas		Miscellaneous and unapportioned		
	M. cu. ft.	Value	Amount	Value	Substance
$199,240					
251,586					
233,454					
193,502					
297,276					
160,845					
				$362	Platinum.
				140	Platinum.
			12.5 ozs.	204	Platinum.
			30.8 ozs.	555	Platinum.
13,074			1,280 cu. ft.	1,280	Granite.
29,170	600	$300	2,450 tons	7,640	Clay.
				20,985	Unapportioned, 1900-1909.
36,700	1,000	500	250 tons	750	Clay.
37,756	300	150	937 tons	937	Clay.
229,730	300	150	396 tons	400	Clay.
439,808	300	150	7,750 lbs.	1,201	Copper.
208,204	300	150	3 ozs.	115	Platinum.
335,292	[2]			1,320	Copper and natural gas.
60,260	[2]		7 ozs.	296	Platinum.
				192,255	Brick, clay, granite, natural gas.
27,014	[2]		6 ozs.	351	Platinum.
				9,312	Brick, clay, mineral water, natural gas, volcanic ash.
			370 tons	21,744	Chromite.
			210 tons	420	Clay.
51,082	640	85		116	Granite.
			1,520 tons	57,751	Manganese.
			2 ozs.	140	Platinum.
				2,516	Brick, mineral water, pumice.
25,198	[2]			9,271	Brick and clay.
				1,148	Mineral water and natural gas.
133,290			859 tons	18,513	Manganese.
				5,436	Brick, clay, granite, mineral water, natural gas, volcanic ash.
131,688	[2]		75 tons	190	Pottery clay.
				4,628	Brick, mineral water, natural gas, platinum, pumice.
				6,399	Brick and clay.
117,308	[2]			153	Mineral water and natural gas.
			4 fine ozs.	413	Platinum.
422,519	[2]			9,915	Clay and clay products, mineral water, natural gas, platinum.
476,449	[2]			7,753	Brick, clay, mineral water, natural gas, platinum.
699,740				6,207	Brick, pottery clay, mineral water, natural gas, platinum.
700,736				4,052	Brick and clay.
				633	Natural gas and platinum.
554,963				6,096	Includes brick, clay, natural gas and platinum.

MINERAL PRODUCTION OF

Year	Gold, value	Silver, value	Mineral water		Brick	
			Gallons	Value	M	Value
1928	1,788	7			[2]	
1929	2,372	101			[2]	
1930	2,255	9			[2]	
1931	2,678	5			[2]	
1932	2,549	4			[2]	
1933	5,902	11				
1934	28,978	80			[2]	
1935	31,677	70			[2]	
1936	36,155	118			[2]	
1937	27,230	94			[2]	
1938	20,825	58			[2]	
1939	45,955	113			[2]	
1940	20,685	61			[2]	
1941	13,370	37			[2]	
1942	140,805	453				
1943	6,965	20			[2]	
Totals	$2,963,598	$4,378	[2]103,825	$40,450	[2]15,405	$135,318

Grand total value, $11,801,243.

[1] Recalculated to 'commercial' from 'coining value' as originally published.
[2] See under 'Unapportioned.'
[3] Includes crushed rock, rubble, rip-rap, sand, gravel.

HUMBOLDT COUNTY, 1880-1943—Continued

Miscel-laneous stone[3], value	Natural gas		Miscellaneous and unapportioned		
	M. cu. ft.	Value	Amount	Value	Substance
291,491	[2]	------------	------------	6,941	Brick, natural gas.
270,422	[2]	------------	64,533 lbs.	11,361	Copper.
			------------	9,422	Brick, clay, natural gas.
263,025	[2]	------------	------------	5,344	Brick, clay, natural gas, platinum.
194,324	[2]	------------	------------	2,979	Brick, clay, natural gas, platinum.
112,877	[2]	------------	------------	2,045	Brick, clay, natural gas, platinum.
65,012	[2]	------------	------------	126	Copper, natural gas.
50,371	[2]	------------	------------	2,003	Brick, clay (pottery), natural gas.
50,707	[2]	------------	------------	2,611	Brick, pottery clay, natural gas.
37,829	[2]	------------	------------	3,996	Brick, pottery clay, natural gas.
70,596	[2]	------------	------------	2,795	Brick, clay, natural gas, platinum.
73,705	[2]	------------	------------	2,593	Brick, clay, natural gas, platinum.
81,556	[2]	------------	------------	5,526	Brick, clay, natural gas, platinum.
105,825	[2]	------------	------------	7,019	Brick, pottery clay, natural gas.
53,392	[2]	------------	------------	18,466	Brick, chromite, clay, natural gas, platinum.
66,325	[2]	------------	6,409 lbs.	775	Copper.
			------------	86,447	Chromite, manganese, natural gas.
176,906	[2]	------------	------------	53,936	Brick, chromite, clay (pottery), manganese ore, natural gas.
$8,030,147	[2]3,440	$1,485	------------	$625,867	

MINERAL PRODUCTION OF IMPERIAL COUNTY, 1907 [1]-1943

Year	Brick		Gold, value	Silver, value	Miscellaneous stone, value	Miscellaneous and unapportioned		
	M	Value				Amount	Value	Substance
1907	1,000	$10,000	--------	--------	--------	--------	--------	
1908	2,225	22,250	$5,848	$123	--------	375 lbs.	$51	Copper.
1909	2,000	20,000	59,705	524	--------	--------	--------	
1910	1,680	10,078	[2]87,341	[2]237	--------	--------	--------	
1911	1,200	7,000	[2]97,855	[2]189	--------	--------	--------	
1912	3,250	20,000	--------	--------	$10,000	--------	--------	
1913	5,500	44,000	31,700	94	12,000	750 cu. ft.	7,260	Marble.
1914	4,900	29,400	210,428	8,961	--------	13,081 lbs.	1,730	Copper.
1915	2,958	17,916	14,369	42	40,095	65 lbs.	11	Copper.
						--------	5,000	Other minerals.
1916	[3]	--------	23,338	155	34,834	--------	47,006	Brick, copper, lead, pumice, strontium.
1917	and tile	19,260	919	5	65,660	1,907 tons	38,140	Mangaucse.
						--------	5,416	Copper, potash, pumice.
1918	and tile	11,670	247	1,248	34,787	1,241 tons	46,900	Manganese.
						--------	14,840	Copper, lead, pumice.
1919	[3]	--------	--------	8,607	63,900	--------	67,936	Brick, lead, pumice, salt.
1920	[3]	--------	--------	2,183	127,412	624 tons	16,500	Pumice.
						--------	23,787	Other mincrals.
1921	654	6,363	537	920	171,173	--------	3,825	Other minerals.
1922	--------	--------	350	18,024	154,560	--------	15,805	Brick, gypsum, lead, marble, pumice.
1923	--------	--------	--------	--------	101,833	--------	162,900	Brick, gold, gypsum, pumice, silver, soda (salt cake).
1924	--------	--------	258	1	78,032	--------	61,617	Brick, gems (dumortierite), gypsum, pumice.
1925	[3]	--------	[3]	[3]	148,942	--------	182,023	Brick, cyanite, gypsum and pumice.
1926	[3]	--------	238	19	312,130	--------	154,927	Brick, cyanite, gypsum, lead and pumice.
1927	[3]	--------	257	3	129,658	--------	221,059	Brick, copper, cyanite, gypsum and pumice.
1928	[3]	--------	25	1	98,790	--------	142,862	Brick, copper, cyanite, feldspar, gypsum, pumice, silica.
1929	--------	--------	1,030	16	230,199	--------	278,587	Bentonite, copper, cyanite, feldspar, mica, pumice, silica.
1930	--------	--------	148	--------	218,686	--------	149,189	Gypsum, pumice, cyanite.
1931	--------	--------	649	1	429,782	--------	97,594	Gypsum, mica, pumice, cyanite.
1932	--------	--------	16,212	149	171,694	--------	63,672	Clay (pottery), gypsum, mica, pumice, cyanite.
1933	--------	--------	6,293	76	86,962	--------	73,527	Carbon dioxide, clay, gypsum, mica, cyanite.
1934	--------	--------	9,973	71	48,066	--------	50,370	Carbon dioxide, cyanite, copper, gypsum, pumice, salt.
1935	--------	--------	59,406	2,981	20,695	--------	41,053	Carbon dioxide, gypsum, mica, pumice, salt, cyanite.
1936	--------	--------	41,965	573	143,350	--------	70,873	Carbon dioxide, copper, lead, gypsum, mica schist, pumice, salt.
1937	--------	--------	298,095	2,542	197,981	118,138 lbs.	14,295	Copper.
						8,210 lbs.	484	Lead.
						--------	164,004	Carbon dioxide, clay, iceland spar, gypsum, mica schist, pumice, cyanite, salt.
1938	--------	--------	448,490	2,800	60,871	70,000 lbs.	6,860	Copper.
						--------	87,206	Carbon dioxide, iceland spar, gypsum, mica schist, cyanite, salt.
1939	--------	--------	687,995	6,076	45,750	67,328 lbs.	7,002	Copper.
						--------	75,440	Carbon dioxide, lead, iceland spar, gypsum, cyanite, limestone, manganese ore, salt.

MINERAL PRODUCTION OF IMPERIAL COUNTY, 1907 [1]-1943—Continued

Year	Brick		Gold, value	Silver, value	Miscellaneous stone, value	Miscellaneous and unapportioned		
	M	Value				Amount	Value	Substance
1940	------	----------	$252,665	$1,865	$64,553	11,201 lbs.	$1,266	Copper.
						------------	140,831	Carbon dioxide, iceland spar, gypsum, cyanite, lime, stone, magnesite, salt, strontium.
1941	------	----------	86,765	362	65,203	------------	426,478	Calcium chloride, carbon dioxide, copper, iceland spar, gypsum, manganese ore, mica schist, cyanite, salt, strontium, sulphur.
1942	------	----------	6,090	120	62,470	------------	438,450	Calcium chloride, carbon dioxide, copper, lead, gems, gypsum, magnesium chloride, manganese, salt, kyanite, salt cake, strontium.
1943	------	----------	----------	----------	99,452	------------	585,751	Carbon dioxide, gems (iceland spar), gypsum, manganese ore, kyanite, strontium.
Totals	------	[3]$217,937	[3]$2,449,191	[3]$58,968	[3]$3,529,700	------------	$3,992,537	

Grand total value, $10,248,333.

[1] Imperial County was created August, 1907, from a part of San Diego County.
[2] Includes production of San Diego County.
[3] See under 'Unapportioned.'

MINERAL PRODUCTION OF

Year	Gold, value	Silver, value	Lead		Copper		Zinc		Borax, value
			Pounds	Value	Pounds	Value	Pounds	Value	
1880	$48,648	$173,916							
1881	170,000	140,000							
1882	220,000	130,000							
1883	90,000	38,000							
1884	80,000	82,000							
1885	24,998	73,461							
1886	20,156	101,670							
1887	10,649	103,370							
1888	25,000	75,000							
1889	193,957	30,706							
1890	62,432	88,320							
1891	35,466	112,730							
1892	13,930	35,995							
1893	25,945	52,475							
1894	52,639	83,640	900,000	$27,000					$81,29
1895	92,142	188,329	1,498,000	46,438					40,00
1896	238,507	108,619	1,220,000	36,600					24,90
1897	159,840	50,063	564,000	19,176					
1898	137,107	73,503	580,000	21,170	49,829	$3,986			33,00
1899	114,187	57,529	662,000	28,135					24,00
1900	213,655	113,483	971,000	38,840					13,90
1901	162,406	56,573	601,000	24,040	8,566	1,349			24,25
1902	74,397	14,484	257,500	9,013	1,100	126			36,39
1903	66,045	18,200	95,000	3,420	23,450	3,098			26,40
1904	150,474	7,122	124,000	5,270	25,508	3,252			
1905	135,959	29,741	345,680	16,247	151,606	23,649			
1906	19,449	13,358	208,018	11,857	4,145	800			
1907	57,241	44,440	261,140	13,096	6,779	1,356	144,213	$8,598	*
1908	308,873	30,900	683,401	28,244	6,820	938			*
1909	457,486	47,117	2,364,137	131,199	39,888	5,073			*
1910	408,509	129,590	2,866,227	127,385	58,801	7,489			*
1911	574,945	45,678	1,182,122	53,195	27,889	3,486	*		*
1912	369,758	45,316	1,207,593	54,342	48,584	8,016	*		*
1913	237,310	136,854	3,322,308	146,182	113,860	17,648	*7,149,523	449,701	*
1914	275,000	255,000	4,626,934	180,450	336,423	44,744	399,641	20,381	*
1915	317,905	127,894	4,323,639	203,211	154,722	27,076	4,625,162	573,520	*8,162,727
1916	131,722	232,441	11,185,321	771,787	274,032	67,412	5,758,703	771,666	[1]
1917	125,394	534,599	19,318,642	1,661,403	175,273	47,850	3,535,000	359,550	[1]
1918	100,240	441,548	12,223,471	867,866	338,518	83,614	2,517,045	229,051	[1]
1919	69,560	194,151	3,643,485	193,105	169,713	31,567	1,192,353	87,042	[1]
1920	55,634	258,929	4,612,338	368,987	144,286	26,549	[1]		
1921	80,373	86,020	1,052,253	47,351	45,725	5,898			
1922	85,265	256,009	6,264,138	344,528	69,537	9,388	[1]		[1]
1923	36,702	265,023	9,541,868	667,931	77,349	11,370			[1]

* Combined to conceal individual annual output.
† Includes crushed rock, rubble, rip-rap, sand and gravel.
[1] See Under 'Unapportioned.'
[2] Includes antimony, borax, gypsum, marble, molybdenum, salt, tungsten.
[3] Includes asbestos, barytes, borax, gypsum, marble, molybdenum.
[4] Includes borax, dolomite, marble, pumice, salt, soda, talc, tungsten.
[5] Includes borax, dolomite, fuller's earth, marble, volcanic ash, salt, talc, zinc.
[6] Includes borax, building stone, marble, pumice, soda.
[7] Includes borax, building stone, clay (pottery), fuller's earth, limestone, marble, pumice, soda, talc, zinc.
[8] Includes building stone, borates, fuller's earth, gems, marble, pumice, tungsten concentrates.

INYO COUNTY, 1880-1943

Soda		Soapstone and talc		Marble		Miscellaneous and unapportioned		
Tons	Value	Tons	Value	Cu. ft.	Value	Amount	Value	Substance
----	----	----	----	----	----	----	----	
----	----	----	----	----	----	----	----	
----	----	----	----	----	----	----	----	
----	----	----	----	----	----	----	----	
----	----	----	----	----	----	----	----	
----	----	----	----	----	----	----	----	
----	----	----	----	----	----	----	----	
----	----	----	----	----	----	----	----	
----	----	----	----	----	----	----	----	
----	----	----	----	----	----	----	----	
----	----	----	----	----	----	----	----	
----	----	----	----	----	----	----	----	
----	----	----	----	----	----	----	----	
1,530	$20,000	----	----	12,500	$62,500	----	----	
1,900	47,500	----	----	10,000	50,000	----	----	
3,000	65,000	----	----	3,000	24,000	----	----	
5,000	110,000	----	----	----	----	----	----	
7,000	154,000	----	----	4,000	12,000	----	----	
10,000	250,000	----	----	----	----	----	----	
1,000	50,000	----	----	----	----	20 tons	$700	Antimony.
8,000	400,000	----	----	----	----	----	----	
7,000	50,000	----	----	----	----	----	----	
*	*	----	----	20,000	20,000	300 tons	2,400	Salt.
*	*	----	----	3,000	3,000	400 tons	800	Salt.
*	*	----	----	17,000	17,000	----	----	
*	*	----	----	1,200	4,800	----	----	
*	*	----	----	1,000	4,000	----	----	
*	*	----	----	----	----	----	----	
*	*	----	----	----	----	----	1,417,217	Unapportioned, 1900-1909.
*	*	----	----	----	----	45,000 tons	31,500	Rubble.
*	*	----	----	----	----	46,450 tons	32,555	Rubble.
						----	174	Gems.
*	*	1,050	$5,250	----	----	----	648	Rubble.
*	*	1,000	4,400	3,200	11,500	----	835	Rubble.
						13,500 tons	54,000	Salt.
*	*	390	2,060	3,500	10,500	13,500 tons	54,000	Salt.
12,937	*496,250	1,513	14,000	----	----	----	80,430	Antimony, dolomite, marble, pumice, salt.
			Total	[1]78,400	$219,300			
				Miscellaneous stone†, value				
10,593	264,825	685	4,606	23,040		3,596 tons	14,700	Dolomite.
						----	2,317,897	Other minerals[2].
19,604	861,160	4,736	41,044	3,000		11,315 tons	22,630	Dolomite.
						----	2,639,600	Other minerals[3].
[1]	----	9,635	72,549	5,000		14,390 tons	32,056	Dolomite.
						589 tons	854,025	Tungsten concentrates.
						----	2,491,727	Borax, limestone, salt, soda.
[1]	----	[1]	----	7,850		2,360 tons	12,000	Limestone.
						----	2,097,271	Other minerals[4].
23,132	933,023	[1]	----	1,190		15,240 tons	31,080	Limestone.
						----	2,214,008	Other minerals[5].
[1]	----	4,350	77,250	16,250		22,112 tons	49,073	Dolomite.
						1,185 tons	8,295	Fuller's earth.
						----	1,089,708	Other minerals.[6]
[1]	----	[1]	----	12,000		43,778 tons	72,284	Dolomite.
						----	1,358,207	Other minerals.[7]
24,116	662,747	5,981	104,976	19,500		47,542 tons	79,793	Dolomite.
						----	997,539	Other minerals.[8]

MINERAL PRODUCTION (

Year	Gold, value	Silver, value	Lead		Copper		Zinc		Borax, value
			Pounds	Value	Pounds	Value	Pounds	Value	
1924	$19,997	$115,799	4,813,718	$385,098	79,995	$10,479			(1)
1925	43,774	117,763	6,307,105	548,196	73,003	10,367	145,000	$11,020	(1)
1926	26,871	77,693	6,541,741	523,339	42,462	5,945	76,889	5,767	(1)
1927	10,109	47,384	2,173,032	136,901	30,010	3,931			(1)
1928	10,781	23,948	1,733,120	100,421	22,250	3,204			(1)
1929	16,889	23,209	1,335,831	84,157	17,733	3,121			(1)
1930	20,466	42,961	3,452,159	172,608	19,607	2,549			(1)
1931	40,603	41,311	3,703,232	137,020	8,542	777			(1)
1932	42,113	24,105	2,204,108	66,123	12,672	798			(1)
1933	62,312	7,332	601,135	22,241	7,940	508	255,944	10,741	(1)
1934	266,109	25,943	530,037	19,611	33,363	2,669	721,719	31,034	(1)
1935	656,339	27,621	578,583	23,143	42,589	3,535	274,725	12,088	(1)
1936	744,135	39,895	556,399	25,594	57,230	5,265			(1)
1937	620,585	78,899	1,908,280	112,589	71,080	8,601	22,364	1,454	(1)
1938	625,240	26,581	322,004	14,812	65,844	6,453			(1)
1939	443,275	20,434	174,407	8,197	74,543	7,752	7,285	379	(1)
1940	415,555	61,623	2,130,330	106,576	212,038	23,960	130,821	8,242	(1)
1941	563,360	113,228	6,603,348	376,391	281,211	33,183	438,475	32,886	(1)
1942	409,850	237,062	10,170,864	681,448	753,556	91,180	680,422	63,279	1
1943	153,125	273,706	11,400,763	855,057	973,870	126,603	1,064,722	114,990	1
Totals	$11,521,733	$6,610,303	163,945,411	$10,547,910	5,131,941	$786,614	29,130,006	$2,791,389	[1]$8,466,[illegible]

Grand total value, $103,656,778.

[1] See under 'Unapportioned.'

[9] Includes alum, borates, building stone (tuff), fuller's earth, glauber salt, lime, limestone, magnesium, sulpha pumice, radio galena crystals, soda (ash and bicarbonate), tungsten concentrates.

[10] Includes borates, building stone (tuff), fuller's earth, graphite, limestone, pumice, soda (ash and bicarbonat tungsten concentrates.

[11] Includes borates, building stone (tuff), dolomite, gems, limestone, salt, tungsten concentrates.

[12] Includes borates, building stone (tuff), dolomite, fuller's earth, lime.

[13] Includes borates, dolomite, fuller's earth, gems, granite (tuff), salt, tungsten.

[14] Includes borates, dolomite, fuller's earth, gems, granite (tuff), limestone, marble, pumice, salt, tungsten.

[15] Includes barytes, bentonite, borates, dolomite, gems, granite (tuff), lime, marble, mineral water, pumice, s silica, talc, tungsten.

[16] Includes barytes, bentonite, borates, dolomite, lime, limestone, pumice, quicksilver, talc, miscellaneous stone.

[17] Includes bentonite, borates, dolomite, feldspar, quicksilver, silica, slate, talc, soda, sulphur.

[18] Includes bentonite, borates, pottery clay, molybdenite, silica, slate, talc, soda, sulphur, tungsten.

[19] Includes bentonite, borates, dolomite, gems, slate, soda, sulphur, talc.

[20] Includes bentonite, borates, dolomite, quicksilver, slate, talc, soda, sulphur, stone miscellaneous.

[21] Includes bentonite, borates, dolomite, onyx, quicksilver, talc, soda, stone miscellaneous, sulphur, tungsten, sl

[22] Includes bentonite, borates, dolomite, iron ore, quicksilver, slate, soda, sulphur, talc and tungsten ore.

[23] Includes borates, dolomite, garnets, iron ore, limestone, onyx, quicksilver, slate, soda, sulphur, tungsten (

[24] Includes antimony, borates, bentonite, dolomite, garnets, iron ore, lime, limestone, onyx, molybdenum ore, qui silver, soda, talc, tungsten ore.

[25] Includes bentonite, borates, dolomite, iron ore, limestone, mica schist, molybdenum ore, quicksilver, soda, sulph talc.

[26] Includes antimony, asbestos, bentonite, borates, dolomite, iron ore, limestone, mica, schist, molybdenum (pumice, soda, sulphur.

[27] Antimony, bentonite, borates, dolomite, iron ore, limestone, molybdenum, pumice, quicksilver, salt, soda, sulph

[28] Borates, limestone, manganese ore, molybdenum, pumice, quicksilver, soda.

INYO COUNTY, 1880-1943—Continued

Soda		Soapstone and talc		Miscel-aneous stone, value	Miscellaneous and unapportioned		
Tons	Value	Tons	Value		Amount	Value	Substance
(1)	------------	5,942	$98,806	$12,500	17,197 tons	$37,491	Dolomite.
					------------	1,429,925	Other minerals.[9]
(1)	------------	5,335	89,134	------------	------------	1,764,891	Other minerals.[10]
60,473	$1,232,081	6,487	98,563	12,000	2,275 tons	20,130	Fuller's earth.
					300 tons	1,750	Pumice.
					------------	831,695	Other minerals.[11]
53,328	1,293,379	7,009	99,416	6,000	344 tons	2,496	Pumice.
					------------	920,218	Other minerals.[12]
86,664	1,292,165	8,563	121,177	44,831	163 tons	1,630	Pumice and volcanic ash.
					------------	234,410	Other minerals.[13]
70,440	1,525,060	8,274	120,875	224,625	------------	298,275	Other minerals.[14]
67,119	1,273,098	(1)	------------	310,675	------------	438,409	Other minerals.[15]
56,251	903,511	(1)	------------	(1)	------------	224,486	Other minerals.[16]
(1)	------------	(1)	------------	5,800	431 tons	4,845	Pumice and volcanic ash.
					------------	580,237	Other minerals.[17]
(1)	------------	(1)	------------	18,690	48,487 tons	164,987	Dolomite.
					894 tons	4,150	Pumice and volcanic ash.
					------------	724,346	Other minerals.[18]
(1)	------------	(1)	------------	66,081	673 tons	5,115	Pumice and volcanic ash.
					------------	877,163	Other minerals.[19]
(1)	------------	(1)	------------	(1)	594 tons	10,034	Pumice and volcanic ash.
					------------	827,046	Other minerals.[20]
(1)	------------	(1)	------------	(1)	1,567 tons	18,492	Pumice and volcanic ash.
					------------	633,466	Other minerals.[21]
(1)	------------	(1)	------------	22,087	2,721 tons	29,518	Pumice and volcanic ash.
					------------	565,276	Other minerals.[22]
(1)		18,581	194,588	32,026	2,061 tons	19,922	Pumice and volcanic ash.
					------------	664,271	Other minerals.[23]
(1)		(1)	------------	4,230	5,886 tons	56,170	Pumice.
					4,811 tons	73,741	Sulphur.
					------------	1,000,419	Other minerals.[24]
(1)		(1)	------------	41,579	11,521 lbs.	1,613	Antimony.
					3,974 tons	20,690	Pumice.
					64,822 units	1,440,889	Tungsten ore.
					------------	734,979	Other minerals.[25]
(1)		20,003	255,775	25,090	117,166units	2,868,870	Tungsten ore.
					------------	751,243	Other minerals.[26]
[1]	------------	29,000	356,345	171,559	193,723units	4,705,615	Tungsten ore.
					------------	1,418,510	Other minerals.[27]
[1]	------------	29,614	401,745	5,870	213,700units	4,841,322	Tungsten ore.
					------------	1,252,988	Other minerals[28]
[1]629,107	$11,883,779	168,148	$2,162,559	$1,075,143	------------	$47,591,178	

MINERAL PRODUCTION OF KINGS COUNTY, 1894[1]-1943

Year	Brick		Gypsum		Natural gas		Quicksilver		Miscellaneous and unapportioned		
	M	Value	Tons	Value	M cu. ft.	Value	Flasks	Value	Amount	Value	Substance
1894	-------	--------	------	------	----------	--------	------	-------	--------	--------	
1895	-------	--------	------	------	----------	--------	------	-------	--------	--------	
1896	-------	--------	------	------	----------	--------	------	-------	--------	--------	
1897	-------	--------	------	------	----------	--------	------	-------	--------	--------	
1898	1,250	$8,450	------	------	----------	--------	------	-------	--------	--------	
1899	1,650	11,550	------	------	----------	--------	------	-------	--------	--------	
1900	750	5,000	------	------	----------	--------	------	-------	--------	--------	
1901	1,000	5,000	------	------	----------	--------	------	-------	--------	$10,500	Unapportioned 1900-1909.
1902	3,500	19,000	------	------	----------	--------	------	-------	--------	--------	
1903	3,400	24,200	------	------	----------	--------	------	-------	--------	--------	
1904	3,100	23,300	------	------	----------	--------	------	-------	--------	--------	
1905	3,400	24,000	------	------	----------	--------	*250	$9,000	--------	--------	
1907	1,000	8,000	------	------	----------	--------	------	-------	100 tons	1,000	Fuller's earth.
1908	3,000	24,000	100	$400	----------	--------	------	-------	50 tons	1,000	Fuller's earth.
1909	1,000	8,500	100	300	360	$360	------	-------	100 tons 20 tons	2,000 100	Fuller's earth. Mineral paint.
1910	400	3,200	100	490	1,200	600	100	4,525	100 tons 10 tons	1,000 270	Fuller's earth. Mineral paint.
1911	-------	--------	20	100	1,800	800	------	-------	--------	--------	
1912	-------	--------	50	200	6,000	1,650	------	-------	--------	--------	
1913	-------	--------	100	300	1,916	575	------	-------	20 tons --------	60 400	Mineral paint Other minerals.
1914	-------	--------	20	80	150	500	------	-------	20 tons	160	Fuller's earth.
1915	-------	--------	------	------	258	608	[2]	-------	--------	18,000	Fuller's earth, quicksilver.
Totals	26,250	$184,200	490	$1,870							

Year	Petroleum		Natural gas		Quicksilver		Miscellaneous and unapportioned		
	Barrels	Value	M cu. ft.	Value	Flasks	Value	Amount	Value	Substance
1916	----------	----------	258	608	[2]	-------	--------	26,180	Other minerals.
1917	----------	----------	3,569	2,777	------	-------	--------	--------	
1918	----------	----------	2,460	590	[2]	-------	--------	8,639	Other minerals.
1919	----------	----------	2,550	1,630	[2]	-------	--------	49,653	Other minerals.
1920	----------	----------	2,765	1,250	436	28,620	--------	--------	
1921	----------	----------	2,090	980	[2]	-------	--------	4,742	Other minerals.
1922	----------	----------	1,790	870	------	-------	--------	5,936	Other minerals.
1923	----------	----------	1,990	970	------	-------	--------	585	Other minerals.
1924	----------	----------	1,480	725	------	-------	--------	--------	
1925	----------	----------	740	440	------	-------	--------	80	Other minerals.
1926	----------	----------	470	245	------	-------	--------	475	Other minerals.
1927	----------	----------	[2]	--------	------	-------	--------	1,599	Natural gas and petroleum.
1928	198,784	$576,474	----------	--------	------	-------	--------	1,240	Miscellaneous stone.
1929	1,968,729	3,294,688	25,809,765	981,343	------	-------	--------	105	Unapportioned.
1930	6,176,130	9,437,771	47,959,591	3,668,722	------	-------	--------	350	Unapportioned.
1931	17,607,527	12,735,524	120,253,916	4,636,107	------	-------	--------	270	Unapportioned.
1932	21,981,835	18,398,796	92,279,724	4,322,190	------	-------	--------	--------	
1933	21,663,622	20,253,320	104,893,813	5,216,344	------	-------	--------	4,588	Unapportioned
1934	21,393,483	23,104,962	96,939,145	4,957,070	------	-------	--------	694 3 2,560 2,100	Gold. Silver. Miscellaneous stone. Unapportioned.
1935	7,167,687	7,490,233	65,372,401	3,088,477	------	[1]	--------	83 1,209	Gold. Quicksilver, stone.
1936	5,317,882	7,115,273	47,529,901	2,834,058	------	-------	--------	600	Unapportioned.
1937	5,800,589	8,026,823	45,924,599	2,944,800	------	-------	--------	964	Unapportioned.
1938	8,717,827	12,117,779	53,242,662	3,290,987	------	-------	--------	2,118	Unapportioned.
1939	9,871,899	14,115,828	46,054,600	2,536,102	25	2,583	--------	2,930	Stone.
1940	9,212,121	11,625,696	36,016,041	2,018,422	23	3,827	--------	1,500	Stone.
1941	7,789,574	9,479,813	29,639,352	1,818,088	------	-------	--------	2,166	Unapportioned.
1942	8,906,011	11,131,160	37,266,063	1,821,000	------	-------	--------	2,960	Unapportioned
1943	10,326,575	12,907,422	67,277,904	3,035,350	------	-------	-------- --------	72,175 748	Miscellaneous. stone. Other minerals.
Totals	164,100,275	$181,811,562	916,491,323	$47,185,229	[2]834	$144,388	--------	$231,841	

Grand total value, $229,559,090.

* Flasks of 75 pounds, June, 1904-December, 1927 (inc.); of 76 pounds since.

[1] Kings County was created March 22, 1893, from a part of Tulare County, and in 1909 extended by annexing a portion of Fresno County.

[2] See under 'Unapportioned.'

MINERAL PRODUCTION OF KERN COUNTY, 1880-1943

Year	Asphaltum Tons	Asphaltum Value	Brick M	Brick Value	Copper Pounds	Copper Value	Fuller's earth Tons	Fuller's earth Value	Gold, value	Lime Barrels	Lime Value	Limestone Tons	Limestone Value	Silver, value	Natural gas M cu. ft.	Natural gas Value	Petroleum Barrels	Petroleum Value	Miscellaneous and unapportioned Amount	Miscellaneous and unapportioned Value	Substance
1880									$94,214					$396							
1881									190,000					14,000							
1882									260,000					20,000							
1883									150,000					5,000							
1884									100,000					5,000							
1885									72,003												
1886									94,640					1,721							
1887									72,358					150							
1888									60,000					2,500							
1889									242,676					7,517							
1890									117,341					586							
1891									107,735					61							
1892									107,738					73							
1893									83,665					1,754							
1894	6,900	$138,000							310,707	33,000	$26,500			30,700			11,215	$69,334	92 tons	$3,720	Antimony.
1895	1,400	28,000							231,433	25,400	24,980		$10,000	46,064			116	116	33 tons	1,485	Antimony.
1896	2,484	44,680							590,867	37,100	32,320	5,000	5,000	34,650			235	235	15 tons	2,250	Antimony.
1897	4,650	86,350	1,100	$6,600					754,313	53,400	70,370			10,471					25 tons	3,500	Antimony.
1898	1,850	50,000	2,000	14,000					1,017,930	42,000	29,900			6,543			10,000	10,000	220 tons 40 tons 27 tons	1,100 1,200 3,382	Coal. Antimony. Borax.
1899	2,537	57,670	1,600	11,400			620	$12,400	863,414	64,700	57,690			6,810			15,000	13,500			
1900	701	14,020	2,525	17,300	4,006	$750	500	3,750	805,252	57,721	51,700			147,736			919,275	827,348		859,927	Unapportioned, 1900-1909.
1901	3,112	43,126	4,600	23,400	420,248	67,606	1,000	19,500	1,007,050	62,000	82,700			40,497			3,902,125	1,131,616	1,600 lbs. 50 tons	64 8,350	Lead. Antimony.
1902	10,150	101,500	3,500	24,500	235,846	27,122	987	19,246	1,165,982	99,360	80,856			99,135			9,777,948	1,955,595	1,000 tons	8,000	Gypsum.
1903	8,006	100,787	9,000	30,000	4,300	559	250	4,750	1,022,353	101,661	76,246			114,614			18,001,148	3,600,230	28 tons 1,000 tons	63 8,000	Bituminous rock. Gypsum.
1904	12,451	124,110	700	4,900			500	9,500	1,426,523	178,038	172,000			151,189			19,608,645	3,431,408			
1905	10,586	105,860	750	6,000					1,160,971	270,650	255,500		44,000	134,944			17,069,715	3,174,966	53 tons 1,350 tons 52 tons	54 11,000 18,800	Clay. Gypsum. Tungsten.
1906	23,136	231,360	4,275	34,200					806,117	205,613	267,096			129,503			13,826,000	3,765,200	215 tons	752 183,600	Clay. Tungsten.
1907	20,443	260,158	2,168	18,428					878,798	175,000	169,822			86,033			15,700,308	4,673,867	1,000 tons	5,500	Gypsum.
1908	50,000	475,000	2,080	19,552					827,087	116,717	87,788			96,550			18,777,871	9,388,935	500 tons	2,000	Gypsum.
1909	54,599	655,391	3,365	29,634			359	5,385	654,799	115,709	88,869			101,633	38,000	$2,714	24,549,758	12,565,246	 1,700 tons 4,781 lbs.	500 8,300 174	Gems. Gypsum. Lead.
1910	76,605	811,846	8,332	63,711					619,974	90,187	86,198		4,331	35,041	975,724	47,364	40,641,159	17,825,212	1,675 tons 160,000 tons	8,305 112,000	Gypsum. Rubble.
1911			5,603	41,426	29,441	3,680			557,471	96,500	82,025	600	406	5,833	1,654,380	165,438	46,562,825	20,207,906	242 tons 230,050 tons 853 tons 2,417 lbs.	121 107,880 4,245 109	Clay. Crushed rock Gypsum. Lead.
1912			1,890	23,120					830,421	162,831	124,804			11,480	4,400,000	325,464	51,448,067	21,762,532	8,479 tons 10,064 lbs.	18,188 885	Gypsum. Lead.
						Total..	[1]4,216	$74,531													
								Miscellaneous stone,[2] value													
1913			1,625	22,000	3,498	542			649,712	135,000	91,200			11,851	7,111,237	568,899	58,698,432	27,038,474	208 tons 10,000 tons 1,376 lbs. 	104 22,750 61 600	Clay. Gypsum. Lead. Other minerals.
1914			3,834	29,214	7,304	983			594,337	81,600	65,100			8,002	6,508,868	300,532	65,332,633	26,721,046	346 tons 82 tons 379 lbs. 20,000 tons 	172 320 15 50,006 180,575	Clay. Gypsum. Lead. Salt. Other minerals.
1915					1,047	183		$59,319	983,319	55,176	39,523	1,425	1,710	13,316	12,163,461	737,638	54,810,660	23,184,913	207 tons 84,371 lbs. 	11,301 3,965 299,097	Antimony ore. Lead. Cement, pottery clay, fuller's earth, gypsum, magnesite, salt, tungsten.
1916			3,177	23,624	24,754	6,089		63,723	747,042	(1)				8,475	16,679,658	1,379,033	54,120,509	34,691,246	145 tons 24,274 lbs. 4,100 tons 193 tons 	5,890 1,675 30,047 23,700 482,387 363,516	Antimony ore. Lead. Lime and limestone. Silica. Tungsten concentrates. Cement, clay, feldspar, fuller's earth, magnesite, quicksilver, salt.
1917			and tile	22,785	251,225	68,584		31,787	537,852	(1)		(1)		7,813	25,819,376	1,445,880	53,065,066	47,387,104	113 tons 9,684 lbs. 300 flasks 49 tons 	16,041 833 27,250 58,148 130,345	Antimony ore. Lead. Quicksilver. Tungsten concentrates. Clay, feldspar, lime, limestone, magnesite, salt.
1918			1,678	16,380	95,580	23,608		311	246,127	23,615	23,615	(1)		7,817	23,545,128	1,507,912	49,049,917	61,410,496		174,419	Lead, limestone, magnesite, manganese, quicksilver, salt, tungsten.
1919			1,709	175,112				28,320	150,589	86,952	112,724	(1)		8,402	25,363,730	1,618,913	47,734,035	64,440,947	17,000 tons 	81,000 9,345	Salt. Fuller's earth, limestone, quicksilver.
1920			3,850	56,550	206	38		31,180	61,187	76,395	106,733			8,385	34,912,865	1,810,147	50,660,438	86,831,901	22,000 tons 3,060 tons 	87,000 20,100 108,270	Salt. Silica. Cement, gems, lead, quicksilver.
1921			5,840	85,820				38,208	84,098	72,629	141,401			1,897	40,136,930	1,026,797	57,434,945	97,639,407	18,500 tons 	93,500 829,115	Salt. Cement, gypsum, limestone, silica.
1922			5,082	66,652				35,585	124,337					6,524	47,644,633	2,282,100	53,512,157	64,803,222	18,000 tons 	66,000 1,106,582	Salt. Cement, copper, lime, silica, lead.
1923			5,271	68,375				9,225	107,051	17,985	214,183	(1)		33,151	42,421,502	2,051,656	45,952,794	37,629,300	18,921 tons 	97,336 1,602,138	Salt. Cement, clay (pottery), gypsum, limestone, pumice, sulphur.
1924			(1)	23,058				5,244	154,132	8,130	96,880			35,902	47,881,308	2,522,551	61,175,405	69,572,934	10,506 tons 	44,115 23,058 1,709,635	Salt. Brick and clay (pottery). Arsenic, cement, copper, lead, pumice, sulphur.
1925			(1)					3,000	135,545					7,455	45,649,645	2,290,608	58,852,742	84,255,094	6,890 tons 	28,858 2,680,166	Salt. Antimony, borates, cement, brick, clay (pottery.)
1926			4,591	55,140				28,000	135,508	(1)				4,667	44,182,140	2,158,867	54,519,646	78,987,887	11,279 tons 	41,116 2,144,589	Salt. Cement, feldspar, fuller's earth, gypsum, lime, pumice, silica.
1927			,835	50,438				79,510	171,100	(1)				8,932	30,401,478	2,057,807	51,570,412	58,738,699	14,960 tons 	69,839 3,553,163	Salt. Borates, cement, clay (oil well mud), copper, feldspar, gypsum, lime, onyx, pumice.
1928			2,126	30,791				78,663	186,453	(1)				5,245	35,107,062	1,916,797	44,098,638	36,803,054		4,043,778	Antimony, borates, cement, clay (pottery), feldspar, fuller's earth, gypsum, lime, pumice, salt.
1929			3,503	44,681				361,895	148,421					2,312	34,409,095	1,861,050	43,577,420	32,290,584	58,551 tons 	85,845 4,004,550	Clay (pottery). Borates, cement, fuller's earth, volcanic ash, quicksilver, salt, tungsten.
1930			(1)		(1)			150,351	165,435					1,757	27,908,423	1,290,090	44,170,810	37,015,139	111,301 tons 371,123 tons 	2,335,190 117,834 1,612,181	Borax. Clay. Brick, cement, copper, feldspar, fuller's earth, gems (rose quartz), gypsum, lead, quicksilver, salt, volcanic ash.
1931			(1)		207	19		108,058	202,108					2,534	26,977,942	1,444,732	35,794,138	22,765,072	27,409 tons 6,307 lbs. 	46,668 233 4,212,034	Clay (pottery and oil well drilling). Lead. Bentonite, borates, brick, cement, feldspar, gypsum, mineral water, volcanic ash, quicksilver, salt.
1932			(1)		(1)			49,677	296,250	(1)		(1)		3,957	26,234,262	1,201,293	35,552,561	23,393,585	14,770 tons 	22,871 3,102,892	Clay (pottery and oil well drilling). Bentonite, borates, brick, cement, copper lead, volcanic ash, salt.
1933			(1)		760	49		70,931	424,376					70,931	20,571,398	916,090	35,349,272	23,521,406		2,931,110	Bentonite, borates, brick, cement, clay (pottery), gems, lead, volcanic ash, quicksilver, salt, wollastonite.
1934			(1)		5,502	440		131,743	1,021,849					73,468	21,309,723	1,017,661	41,823,494	30,475,225	19,520 tons 11,008 lbs. 	30,142 407 4,302,252	Clay (pottery). Lead. Bentonite, borates, brick, cement, gems, volcanic ash, quicksilver, salt, tungsten ore, wollastonite.
1935			(1)		37,971	3,152		124,360	1,391,646					105,978	36,080,134	1,891,675	54,723,481	39,005,553	2,180 lbs. 	87 3,521,958	Lead. Borates, brick, cement, clay, volcanic ash, salt, tungsten.
1936			(1)		1,402	129		184,696	2,401,280					295,591	58,044,172	3,246,196	62,273,932	53,781,287		5,435,585	Bentonite, borates, brick, cement, clay, lead, gypsum, mica schist, volcanic ash, quicksilver, salt.
1937			(1)		5,504	666		237,757	2,405,134					561,712	65,142,854	3,050,521	69,878,714	61,005,918	42,628 tons 2,023 lbs. 	130,482 172 4,909,821	Clay (oil well drilling mud). Lead. Borates, brick, cement, volcanic ash, quicksilver, salt, tungsten ore.
1938			(1)		(1)			240,750	3,034,005					742,256	68,974,704	4,244,897	66,093,496	58,803,255	38,910 tons 6,994 lbs. 	64,821 322 4,397,668	Clay (oil well drilling mud). Lead. Borates, brick, calcium silicate, cement, volcanic ash, quicksilver, salt, copper.
1939			(1)		(1)			158,220	3,151,015					767,633	73,950,832	5,101,065	58,893,865	48,664,001	23,213 tons 28,542 lbs. 	32,373 1,341 4,140,039	Clay (pottery and oil well drilling mud). Antimony, bentonite, brick, calcium silicate, cement, copper, gypsum, quicksilver, salt, tungsten ore, volcanic ash.
1940			(1)		2,617	296		282,576	2,887,255					591,608	70,409,481	4,257,590	60,660,165	50,935,439	42,298 lbs. 27,133 lbs. 70,043 tons 	6,062 1,357 93,964 3,890,585	Antimony. Lead. Gypsum. Bentonite, borates, brick, calcium silicate, cement, clay, volcanic ash, quicksilver, salt.
1941			(1)		5,164	609		347,459	2,800,980					617,381	91,807,125	4,573,754	65,628,935	57,607,724	69,071 tons 31,580 lbs. 112,088 tons 4,414 units 	242,547 1,801 203,506 114,754 4,344,033	Clay (pottery and oil well drilling mud) Lead. Gypsum. Tungsten ore. Antimony, bentonite, borates, brick, calcium silicate, cement, volcanic ash, salt, quartz
1942					2,172	263		449,160	1,991,990					425,019	70,890,547	3,431,558	72,093,741	64,477,255	71,172 tons 156,104 tons 2,591 units 	118,694 206,659 61,682 4,365,607	Clay (pottery and oil-well drilling mud). Gypsum. Tungsten ore. Antimony, bentonite, borates, cement, volcanic ash, salt, silica (quartz).
1943			(1)		2,726	354		190,064	103,705					7,281	65,576,727	3,395,175	84,034,943	86,174,973	96,019 tons 250,989 tons 2,112 units 14,214 lbs. 	261,243 338,049 57,607 1,535 3,715,283	Clay (pottery and oil-well drilling mud). Gypsum. Tungsten ore. Zinc. Bentonite, borates, brick, cement, lead, volcanic ash, salt.
Totals	288,610	$3,327,858	[1]100,555	$1,015,933	[1]1,150,558	$205,718		$3,874,073	$44,838,870	2,653,042	$2,758,912	7,025	$65,441	$5,604,700	1,208,893,933	$69,121,384	1,972,886,215	$1,696,164,466		$86,254,494	

Grand total value, $1,913,506,389.

(1) See under "Unapportioned."
2 Includes crushed rock, rubble, rip-rap, sand, gravel

MINERAL PRODUCTION OF LAKE COUNTY, 1873-1943

	Quicksilver		Mineral water		Chromite		Miscellaneous stone,[1] value	Miscellaneous and unapportioned		
	Flasks	Value	Gallons	Value	Tons	Value		Amount	Value	Substance
1873	880	$70,790								
1874	1,695	178,280								
1875	8,821	743,287								
1876	14,199	624,756								
1877	18,100	675,130								
1878	14,428	474,681								
1879	15,582	309,303								
1880	17,148	531,588								
1881	17,393	518,833								
1882	10,193	287,748								
1883	6,481	186,329								
1884	4,182	127,551								
1885	4,765	146,524								
1886	3,498	124,179								
1887	4,307	182,509								
1888	6,636	282,030	*	*						
1889	4,713	212,085	*	*						
1890	4,232	222,180	*	*						
1891	4,975	225,119	*	*						
1892	11,140	453,509	*	*						
1893	9,731	357,614	*	*						
1894	12,471	382,954	*	*						
1895	12,856	465,074	87,500	$42,000						
1896	6,307	232,484	65,920	32,460						
1897	3,585	134,546	511,950	76,585						
1898	1,729	64,746	523,000	37,350						
1899	2,954	128,179	166,020	75,924						
1900	3,165	127,345	758,600	45,400						
1901	4,395	211,324	201,706	120,360						
1902	3,611	161,568	241,100	126,663						
1903	2,595	106,397	381,040	187,621						
1904	[2]2,854	109,719	659,000	221,000						
1905	1,462	51,937	489,000	219,500						
1906	1,066	38,909	365,000	160,000						
1907	802	30,604	304,340	130,936						
1908	1,300	54,951	246,545	118,300			$10,000			
1909	1,075	56,277	265,000	108,270					28,423	Unapportioned, 1900-1909.
1910	1,048	47,422	212,546	95,005						
1911	899	41,363	227,440	58,933						
1912	209	8,786	202,000	114,500						
1913	395	15,891	209,750	109,938						
1914	331	16,236	254,150	47,267						
1915	492	41,660	165,130	24,371			5,000		1,503	Copper, gold, silver.
1916	1,139	106,496	195,650	54,160	871	$15,070	4,500		770	Other minerals.
1917	1,067	107,071	129,157	22,685	1,466	36,326	2,500	85 tons 	1,900 70	Manganese. Other minerals.
1918	1,540	172,173	87,067	15,006	476	24,790	1,000		2,907	Manganese and natural gas.
1919	229	20,604	62,839	17,471	[3]		1,200		100	Other minerals.
1920	385	24,314	43,693	16,413	84	1,560	13,200	247 tons 	7,816 250	Manganese. Other minerals.
1921	22	880	54,715	26,751			146,508		250	Other minerals.
1922	38	2,000	60,420	29,370			16,669		250	Other minerals.
1923	17	1,050	63,730	44,738			55,000		250	Other minerals.
1924	[3]		66,420	59,423			22,833		14,140	Natural gas and quicksilver.
1925			62,970	57,793			15,300		255	Copper and natural gas.
1926	86	7,778	57,000	58,235			[3]		9,680	Natural gas and miscellaneous stone.
1927	245	29,234	45,643	51,149			4,445	440 M cu. ft.	220	Natural gas.
1928	1,206	145,718	123,500	22,750			19,395	1,000 M cu. ft. 	500 740	Natural gas. Other minerals.
1929	1,697	203,247	30,956	22,100			154,200		8,153	Gems, natural gas.

portion of Fresno County.
[2] See under 'Unapportioned.'

9 extended by annexing

MINERAL PRODUCTION OF LAKE COUNTY, 1873-1943

	Quicksilver		Mineral water		Chromite		Miscellaneous stone,[1] value	Miscellaneous and unapportioned		
	Flasks	Value	Gallons	Value	Tons	Value		Amount	Value	Substance
1873	880	$70,790								
1874	1,695	178,280								
1875	8,821	743,287								
1876	14,199	624,756								
1877	18,100	675,130								
1878	14,428	474,681								
1879	15,582	309,303								
1880	17,148	531,588								
1881	17,393	518,833								
1882	10,193	287,748								
1883	6,481	186,329								
1884	4,182	127,551								
1885	4,765	146,524								
1886	3,498	124,179								
1887	4,307	182,509								
1888	6,636	282,030	*	*						
1889	4,713	212,085	*	*						
1890	4,232	222,180	*	*						
1891	4,975	225,119	*	*						
1892	11,140	453,509	*	*						
1893	9,731	357,614	*	*						
1894	12,471	382,954	*	*						
1895	12,856	465,074	87,500	$42,000						
1896	6,307	232,484	65,920	32,460						
1897	3,585	134,546	511,950	76,585						
1898	1,729	64,746	523,000	37,350						
1899	2,954	128,179	166,020	75,924						
1900	3,165	127,345	758,600	45,400						
1901	4,395	211,324	201,706	120,360						
1902	3,611	161,568	241,100	126,663						
1903	2,595	106,397	381,040	187,621						
1904	[2]2,854	109,719	659,000	221,000						
1905	1,462	51,937	489,000	219,500						
1906	1,066	38,909	365,000	160,000						
1907	802	30,604	304,340	130,936						
1908	1,300	54,951	246,545	118,300			$10,000			
1909	1,075	56,277	265,000	108,270					28,423	Unapportioned, 1900-1909.
1910	1,048	47,422	212,546	95,005						
1911	899	41,363	227,440	58,933						
1912	209	8,786	202,000	114,500						
1913	395	15,891	209,750	109,938						
1914	331	16,236	254,150	47,267						
1915	492	41,660	165,130	24,371			5,000		1,503	Copper, gold, silver.
1916	1,139	106,496	195,650	54,160	871	$15,070	4,500		770	Other minerals.
1917	1,067	107,071	129,157	22,685	1,466	36,326	2,500	85 tons	1,900	Manganese.
									70	Other minerals.
1918	1,540	172,173	87,067	15,006	476	24,790	1,000		2,907	Manganese and natural gas.
1919	229	20,604	62,839	17,471	[3]		1,200		100	Other minerals.
1920	385	24,314	43,693	16,413	84	1,560	13,200	247 tons	7,816	Manganese.
									250	Other minerals.
1921	22	880	54,715	26,751			146,508		250	Other minerals.
1922	38	2,000	60,420	29,370			16,669		250	Other minerals.
1923	17	1,050	63,730	44,738			55,000		250	Other minerals.
1924	[3]		66,420	59,423			22,833		14,140	Natural gas and quicksilver.
1925			62,970	57,793			15,300		255	Copper and natural gas.
1926	86	7,778	57,000	58,235			[3]		9,680	Natural gas and miscellaneous stone.
1927	245	29,234	45,643	51,149			4,445	440 M cu. ft.	220	Natural gas.
1928	1,206	145,718	123,500	22,750			19,395	1,000 M cu. ft.	500	Natural gas.
									740	Other minerals.
1929	1,697	203,247	30,956	22,100			154,200		8,153	Gems, natural gas.

MINERAL PRODUCTION OF LAKE COUNTY, 1873-1943—Continued

Year	Quicksilver		Mineral water		Chromite		Miscellaneous stone[1], value	Miscellaneous and unapportioned		
	Flasks	Value	Gallons	Value	Tons	Value		Amount	Value	Substance
1930	1,760	$195,710	36,758	$14,524			$58,059		$71	Other minerals.
1931	3,046	251,879	24,916	14,034			14,785		70	Other minerals.
1932	1,038	57,850	18,870	6,050			33,164		20	Other minerals.
1933	1,610	90,592	11,799	11,177			32,052		30	Other minerals.
1934	3,497	221,837	11,372	11,005			27,426		213	Other minerals.
1935	4,097	285,426	22,410	13,909			21,315		65 35	Gold. Other minerals.
1936	3,795	292,571	29,729	12,545			35,929		21	Other minerals.
1937	4,012	341,444	38,489	33,858			17,258		25	Other minerals.
1938	3,718	265,430	26,560	12,770			2,898			
1939	4,155	416,150	23,850	7,100			28,290		35	Other minerals.
1940	4,966	845,592	20,588	10,902			27,883		50	Other minerals.
1941	6,053	1,045,726	9,957	4,635			41,447		75	Other minerals.
1942	4,216	792,438	9,100	1,800			37,591		883	Manganese ore, natural gas.
1943	4,206	774,813	8,625	3,073	[3]		15,415		5,080	Chromite, manganese ore.
Totals	306,540	$16,160,420	7,913,520	$2,807,809	[3]2,897	$77,746	$865,262		$84,850	

Grand total value, $20,553,823.

* Bartlett Springs since 1888 and Witter Springs since 1899 reported to U. S. Geological Survey, but no segregated figures available for Lake County previous to 1895.

[1] Includes crushed rock, rubble, rip-rap, sand, gravel.

[2] Flasks of 76½ pounds previous to June, 1904; of 75 pounds thence, through 1927; of 76 pounds since January, 1928.

[3] See under 'Unapportioned.'

In addition to the above, Lake County has produced the following:

Borax	Sulphur	Pounds	Value
1864 to 1868 Borax Lake yielded 590 tons refined borax, worth $414,636; 1872 from Lake Hachinhama, 140 tons, worth $89,600; total 730 tons, worth $504,236.	1865	214,650	$8,030
	1866	675,963	21,970
	1867	487,603	13,420
	1868	503,481	10,080
	Totals	1,881,697	$53,500

Year	Gold, value	Silver, value	Petroleum		Asphalt (tons)	Natural gas (M cu. ft.)	Gypsum		Salt		Gems, value	Mineral water		Brick		Pottery clay		Sandstone and serpentine		Miscellaneous stone,[1] value	Miscellaneous and unapportioned		
			Barrels	Value	Amount	Value	Tons	Value	Tons	Value		Gallons	Value	M	Value	Tons	Value	Cubic feet	Value		Amount	Value	Substance
1880	$7,700	$66,300	*																				
1881	18,000	30,000																					
1882	17,000	24,000																					
1883	20,000	25,000																					
1884	40,060	11,000																					
1885	22,500	1,945																					
1886	21,500	6,750																					
1887	25,000	25,000																					
1888	20,000	10,000																					
1889	38,203	97																					
1890	74,320	7,266																					
1891	40,759																						
1892	219,204																						
1893	14,200																						
1894	34,500		475,650	$617,056			1,134	$11,340						7,500	$37,500					$5,500	9,500 bbls.	$10,800	Lime.
1895	23,330		979,685	732,817			3,790	37,820						45,800	235,000					47,500			
1896	35,468		953,734	812,800			960	9,180						27,478	179,290			[6]1,500	$6,000	30,000			
1897	40,698		1,327,011	1,327,011			1,000	17,250						36,868	228,290			[6]2,500	2,500	30,625	5 tons	200	Infusorial earth.
1898	21,800		1,462,871	1,462,871			2,500	18,500						25,908	188,380	50	$500	10,500 750	5,250 3,000	33,600	2 tons	50	Sulphur.
1899	13,132		1,409,356	1,409,356	[2]1,151	$23,020	3,563	14,250				103,500	$5,805	23,385	147,400			[6]6,000	3,000	132,601	1,600 cu.ft.	2,000	Marble.
1900	5,508		1,722,887	1,722,887	[2]5,000	100,000	2,500	10,000						55,725	275,025	4,576	10,776	[6]7,500 [7]350	3,750 2,000	24,352			
1901	10,312		2,304,432	1,062,038	[2]10,000	[3]1,500 152,538	3,500	35,500	6,650	$10,950				44,435	364,825	130	390	[7]90	90	94,220	10 tons	10	Soapstone.
1902	7,200		2,198,406	1,075,868	[2]16,767	171,904			90	180				52,776	335,670	800	800			105,047	100 tons 14,400 lbs. 60 tons	300 504 360	Mineral paint. Lead. Infusorial earth.
1903	8,674	22	1,060,604	1,294,866	[2]28,308	232,500	5,914	38,441	8,000	20,000		65,000	5,500	70,195	706,334	115	115	[6]2,183	9,734	118,185	1,736 tons 219 tons	2,558 10,124	Glass sand. Soapstone.
1904	12,402	73	2,190,000	1,289,010	[2]30,425	307,083			7,560	24,480		135,750	7,084	128,719	767,827	5,000	5,000	[6]20,211 [7]200	13,145 2,310	83,826	10,000 bbls. 700 tons 228 tons	10,000 4,254 2,315	Lime. Glass sand. Soapstone.
1905	15,035	100	2,854,564	1,056,188	[2]23,718	119,430	11,500	43,500	12,000	20,000		175,000	31,250	109,563	853,810	30,533	16,066	[6]8,784	9,950	69,021			
1906			2,814,000	908,800	[2]25,920	259,200	21,000	69,000	12,000	30,000		85,465	3,128	127,965	826,831	41,350	34,350	[6]19,080 [7]847	9,640 1,694	176,558	18,000 bbls. 50 tons 840 lbs.	18,000 200 169	Lime. Infusorial earth. Copper.
1907			4,318,739	2,633,641	[2]20,610	353,423	7,500	60,000	12,000	36,000		385,060	35,100	101,070	695,272	17,500	20,500	[6]21,196 [7]1,000	10,076 3,000	36,904	1,000 cu.ft. 25,000 bbls.	3,000 25,000	Marble. Lime.
1908			6,244,347	4,082,052	[2]25,000	250,000	12,000	75,000	12,000	48,000	$8,500	573,075	42,857	108,414	800,183	25,034	55,274	[6]6,292	2,000	598,618	200 tons	8,000	Glass sand.
1909	864	2	5,409,392	3,513,102	[2]40,740	616,500	10,000	50,000	10,000	30,000	9,500	266,315	10,988	136,202	1,195,802	14,027	26,888			182,377	1,800 tons 2,000 cu.ft.	14,400 6,000 842,530	Glass sand. Marble. Unapportioned, 1900-1909.
1910			5,127,266	3,185,433	[2]45,872 [2]30,920	591,193 15,208			6,000	12,000	4,900	319,491	23,999	148,723	1,361,653	450	800			324,091	40 tons 90 tons 80 tons 1,600 cu. ft.	320 720 200 4,800	Infusorial earth. Feldspar. Glass sand. Marble.
1911	(4)		4,924,288	3,313,972		[3]15,208			7,592	16,113	5,000	229,019	17,256	160,259	1,442,913	15,650	41,025			553,076	1,100 cu. ft.	3,300	Marble.
1912	(5)		4,484,590	2,798,384		[3]78,672			10,360	46,370	3,000	76,495	6,333	174,862	1,602,258	11,929	12,028			955,608	1,800 tons	1,800	Glass sand.
1913	2,322	27	4,143,090	2,672,686	[2]1,287,794	77,578			10,000	40,000	2,500	255,005	15,140	204,912	1,752,106	7,425	20,135			1,008,810	1,800 tons	2,000 240,000	Glass sand. Other minerals.
1914			3,558,690	1,957,279	[2]1,250,000	75,000			20,000	60,000	2,100	331,151	8,025	133,557	1,244,971	8,283	14,566			653,434	13,203 tons 10 tons	340,669 400	Borax. Potash.
1915			2,931,008	1,843,661	[2]1,729,035	120,783					700	350,171	20,401	88,669	820,312	6,507	1,511			1,022,134		330,020	Barite, borax, potash.
1916			2,875,468	1,871,930	[2]2,083,664	139,522			(a)		600	320,700	8,552	82,005	760,912	6,233	10,549			971,153	1,864 tons 612 tons	324,769 1,684 373,374	Potash. Silica. Borax, copper, graphite, salt.
1917			4,669,583	5,401,430	[2]1,670,476	194,793			(a)		300	188,368	15,902	and tile	939,051	6,276	10,321	(a)		608,026	1,710 tons	400,902 542,783	Potash. Borax, graphite, magnesium, chloride, salt, silica, serpentine, talc.
1918			16,125,190	13,367,755	[2]2,088,959	224,270			(a)		(a)	110,481	15,540	43,381	608,676	12,634	11,820	(a)		547,190	18,630 tons 2,380 tons	121,903 462,600 386,805	Building tile. Potash. Borax, gems, graphite, magnesium, chloride, manganese, salt, serpentine.
1919			15,076,633	20,805,754	[2]4,148,476	458,812			(a)		(a)	125,406	8,787	and tile	1,185,154	11,329	33,343			715,524		399,007	Borax, gems, graphite, magnesium salts, manganese, salt.
1920		(a)	14,026,836	21,488,653	[2]6,225,835	556,465			6,502	6,577		161,466	10,371	127,854	2,333,941	18,684	61,783			1,704,051	27,054 tons	308,476 473,966	Building tile. Borax, copper, gold, graphite, infusorial earth, lead, magnesium salts, silver.
1921		(a)	12,305,605	25,705,254	[2]6,044,277	638,936			(a)		(a)	264,468	13,314	and tile	3,208,448	29,055	62,866			1,763,180		222,943	Borax, gems, gold, graphite, limestone, magnesium, chloride, salt, silver.
1922		(a)	37,726,307	52,930,093	[2]23,254,549	1,653,571			(a)			300,400	15,450	240,424	4,190,485	54,024	66,510			3,390,477	39,005 tons 12,096 tons	397,136 35,168 72,772	Building tile. Limestone. Borates, gold, graphite, magnesium salts, salt, silver.
1923	714	6	158,665,010	154,063,735	[2]134,790,452	8,760,961			(a)			440,583	24,787	310,897	5,307,908	128,825	69,272			5,408,608	53,190 tons 2,717 tons	40,300 522,890 8,770 169,541	Building stone. Building tile. Limestone marl. Borates, diatomaceous earth, magnesium chloride, salt, silica, soapstone.
1924	751	5,515	119,027,428	147,474,953	[2]122,838,521	9,191,395			(a)			1,880,285	88,942	301,957	5,630,259	84,065	132,555			5,923,329	46,941 tons	454,728 117,982	Building tile (hollow). Copper, building stone (tuff), diatomaceous earth, lead, limestone, magnesium, chloride, salt.
1925	409	15,444	121,214,651	173,215,503	[2]98,226,700	8,704,894			(a)			3,811,270	336,038	196,955	3,300,748	217,707	106,817			6,078,605	44,345 tons	426,178 95,274	Building tile (hollow). Copper, lead, limestone, magnesium, chloride, salt, sandstone, zinc.
1926	94	42,658	105,826,337	174,094,324	[2]91,054,723	8,965,307			(a)			4,026,465	200,459	238,326	2,954,067	86,767	99,076			7,472,684	21,471 tons 1,104,507 lbs. 2,564,188 lbs.	102,408 88,361 192,314 66,974	Building tile (hollow.) Lead. Zinc. Building stone (tuff), limestone (marl), salt.
1927	2,345	14,819	103,625,615	114,583,011	[2]50,749,559	7,117,081			(a)			3,934,625	260,198	214,332	2,714,398	147,021	206,175			6,292,078	28,950 tons 312,646 lbs.	288,471 19,697 334,168	Building tile (hollow.) Lead. Copper, graphite, diatomaceous earth, limestone, magnesite, salt, titanium, zinc.
1928	2,157	20	120,549,303	126,709,373	[2]110,432,906	9,058,485			(a)			10,929,535	538,110	148,392	2,101,043	90,781	55,539	(a)		5,622,815	20,302 tons 9,380 cu. ft.	577,397 3,240 76,879	Hollow building tile. Granite. Diatomite, lead, limestone, salt, sandstone, titanium.
1929	991	34	182,444,261	261,871,493	[2]228,708,726	17,410,403			(a)			12,525,565	1,076,504	190,260	2,473,875	88,066	49,304		20,940	5,335,300	18,608 tons 1,981 lbs.	281,605 349 47,497	Hollow building tile. Copper. Granite, limestone, marble, soapstone, salt.
1930			114,533,366	148,549,776	[2]156,470,411	14,065,968			(a)			23,695,673	2,152,028	172,468	1,677,406	78,643	70,693		22,392	4,731,302	28,783 tons	198,478 147,486	Hollow building tile. Diatomite, granite, lead, salt, soapstone, paving blocks.
1931	1,292	64	85,352,013	66,999,266	[2]117,606,814	6,489,448			(a)			11,618,905	620,851	85,593	907,350	27,073	25,350		1,780	3,010,637	11,637 tons 2,245 lbs.	95,357 83 1,318,510	Hollow building tile. Lead. Bentonite, cement, diatomite, granite, iodine, salt.
1932	6,601	13	78,361,176	67,390,611	[2]83,690,705	5,379,497			(a)			8,011,766	938,652	38,099	747,301	38,452	21,078	(a)		1,090,053	6,937 tons	54,740 101,579	Hollow building tile. Diatomite, lead, graphite, salt, sandstone.
1933	15,861	118	67,299,626	60,023,645	[2]70,490,726	4,957,928			(a)			6,672,350	335,310	40,100	630,854	14,195	10,142		8,725	1,841,946	3,410 tons 808 lbs. 2,006 lbs.	10,832 52 74 931,807	Hollow building tile. Copper. Lead. Diatomite, dolomite, graphite, iodine, salt, soapstone.
1934	57,924	533	60,297,000	59,711,578	[3]55,220,382 M. cu. ft	3,421,320			(a)			8,202,017	479,710	30,739	685,611	13,763	7,772		8,250	1,220,639	3,478 tons 517 lbs. 355,270 lbs. 4,008 lbs.	24,960 41 423,016 148 317,723	Hollow building tile. Copper. Iodine. Lead. Unapportioned.
1935	219,405	4,135	70,378,196	64,359,261	66,416,318	4,448,950			(a)			7,370,521	647,416	38,522	850,415	18,118	11,829		4,578	1,136,068	1,164 tons 3,885 lbs.	11,193 322 476,418	Hollow building tile. Copper. Diatomite, graphite, iodine, lead, salt.
1936	177,030	1,893	72,620,590	70,735,648	62,611,713	4,680,852			(a)			9,126,044	435,842	72,794	1,008,038	34,207	23,318		(a)	8,542,619	4,517 tons	32,005 659,187	Hollow building tile. Copper, diatomite, granite, iodine, limestone, marble, salt, slate, soapstone
1937	140,070	1,768	86,659,477	83,922,300	65,459,580	4,655,204			(a)			8,615,029	750,512	80,400	1,586,821	17,828	15,083		(a)	8,655,018	6,365 tons 7,046 lbs.	45,122 416 585,205	Hollow building tile. Lead. Copper, diatomite, dolomite, granite, limestone, iodine, marble, salt, sandstone, slate, soapstone.
1938	171,710	1,220	106,645,794	113,407,606	73,790,818	5,451,390			(a)			8,398,855	340,028	60,367	1,206,002	30,766	55,605			3,836,304	3,022 tons 2,128 lbs.	31,141 209 516,650	Hollow building tile. Copper. Bentonite, diatomite, granite, iodine, limestone, lead, salt, slate, soapstone.
1939	160,440	566	95,906,914	102,085,320	83,677,966	6,877,086			(a)			7,577,237	431,453	76,290	1,377,230	17,836	46,272		(a)	2,921,561	1,862 tons 2,936 lbs. 2,183 tons	20,393 305 103 658,789	Hollow building sand. Copper. Lead. Diatomite, dolomite, granite, iodine, limestone, salt, slate, sandstone, soapstone, titanium.
1940	258,440	2,163	90,696,857	85,342,723	98,100,911	6,462,762			(a)			7,150,460	475,089	88,924	1,187,040	26,046	18,306		(a)	3,369,457	3,446 tons 3,138 lbs.	32,238 355 835,231	Hollow building tile. Copper. Diatomite, dolomite, granite, iodine, limestone, marble, salt, sandstone, slate, titanium.
1941	160,985	1,626	86,550,854	87,264,337	99,607,075	6,192,819			(a)			8,067,783	603,029	51,096	1,408,213	67,283	127,370			4,865,007	3,160 tons 1,111 lbs.	38,212 131 885,466	Hollow building tile. Copper. Lead, diatomite, dolomite, granite, iodine, limestone, marble, salt, titanium.
1942	16,755	163	87,248,336	90,620,837	91,710,973	6,186,706			(a)			8,281,287	283,745	102,751	2,679,889	30,460	67,272		(a)	5,087,331	3,462 tons	34,910 1,142,870	Hollow building tile. Cement, copper, diatomite, iodine, lead, limestone, salt, sandstone, titanium.
1943	3,395	12	57,983,756	90,193,621	54,460,234	8,694,649			(a)			10,640,218	340,173	55,200	2,046,834	39,010	53,454			2,808,592	1,587 tons	15,784 1,323,131	Hollow building tile. Cement, copper, diatomite, dolomite, iodine, limestone, salt, silica (gannister), titanium.
Totals	$2,222,839	$309,368	2,262,516,460	$2,325,333,458		$168,809,987	87,761	$479,781	(a)140,764	$406,670	(a)$45,200	171,295,642	$11,809,678		$71,519,896	1,837,705	$1,811,186	(a)	(a)$165,604	113,514,555		$21,371,898	

Grand total value, $2,897,799,920.

* Commercial production of petroleum in Los Angeles began at least as early as 1874, in the Newhall district, but detailed county segregations are not available for the early years
1 Includes granite, crushed rock, rubble, paving blocks, sand, gravel.
2 Asphalt, tons.
3 Natural gas, thousand cubic feet.
4 Included in Riverside County production
5 Included in Monterey County production.
6 Sandstone
7 Serpentine.
(a) See under 'Unapportioned.'

MINERAL PRODUCTION OF LASSEN COUNTY, 1880-1943

Year	Gold, value	Silver, value	Miscellaneous stone, value	Miscellaneous and unapportioned		
				Amount	Value	Substance
1880	$25,900	----------	----------	----------	----------	
1881	71,000	$1,000	----------	----------	----------	
1882	100,000	20,000	----------	----------	----------	
1883	20,000	5,000	----------	----------	----------	
1884	[1]119,060	341	----------	----------	----------	
1885	15,000	150	----------	----------	----------	
1886	25,812	135	----------	----------	----------	
1887	24,108	304	----------	----------	----------	
1888	50,000	200	----------	----------	----------	
1889	97,503	215	----------	----------	----------	
1890	14,890	300	----------	----------	----------	
1891	3,676	----------	----------	----------	----------	
1892	15,400	----------	----------	----------	----------	
1893	----------	----------	----------	----------	----------	
1894	35,283	----------	----------	----------	----------	
1895	25,000	----------	----------	----------	----------	
1896	40,300	----------	----------	----------	----------	
1897	49,100	850	----------	----------	----------	
1898	37,460	300	----------	----------	----------	
1899	28,898	----------	----------	----------	----------	
1900	19,807	676	----------	----------	----------	
1901	5,900	200	----------	----------	----------	
1902	23,410	244	----------	----------	----------	
1903	91,102	1,203	----------	----------	----------	
1904	116,993	1,515	----------	----------	----------	
1905	----------	----------	----------	----------	----------	
1906	[2]	[2]	----------	----------	----------	
1907	[2]	[2]	----------	----------	----------	
1908	7,284	783	----------	----------	----------	
1909	[3]116,327	[3]1,463	----------	----------	$217,521	Unapportioned, 1900-1909.
1910	[4]82,180	[4]492	----------	----------	----------	
1911	[2]	[2]	----------	----------	1,522	Gold and silver.
1912	----------	----------	----------	----------	----------	
1913	----------	2	$2,030	----------	----------	[5]
1914	1,250	4	775	----------	----------	[5]
1915	----------	----------	870	----------	----------	
1916	----------	----------	9,725	----------	----------	
1917	----------	----------	376	----------	----------	
1918	----------	----------	800	----------	----------	
1919	----------	----------	1,100	----------	----------	
1920	----------	----------	7,313	----------	5,000	Other minerals.
1921	39,943	1,234	42,308	----------	----------	
1922	[2]	[2]	9,540	----------	17,877	Brick, gold and silver.[4]
1923	[2]	[2]	7,600	----------	240	Gold and silver.
1924	2,250	44	35,614	----------	----------	
1925	1,130	24	1,250	----------	----------	
1926	67	1	18,995	----------	----------	
1927	531	9	47,885	----------	1,000	Granite curbing.
1928	492	8	73,399	1,550 cu.ft.	2,600	Granite.
1929	168	2	88,328	----------	200	Other minerals.
1930	2,946	23	14,600	----------	525	Other minerals.
1931	241	2	----------	----------	1,600	Other minerals.
1932	460	3	109,105	----------	----------	
1933	8,309	68	35,228	----------	2,094	Copper, granite, lead.
1934	14,689	278	[2]	304 lbs. ----------	24 13,327	Copper. Other minerals.
1935	12,182	285	8,728	----------	537	Other minerals.
1936	31,010	1,815	32,956	----------	502	Other minerals.
1937	21,175	1,133	63,257	----------	675	Other minerals.
1938	[2]	[2]	58,118	----------	428	Gold, granite, silver.
1939	3,325	241	42,711	----------	----------	
1940	2,695	59	11,962	----------	152	Copper, granite.
1941	2,135	44	39,942	----------	201	Copper, granite.
1942	----------	----------	[2]	----------	35,236	Granite, miscellaneous stone.
1943	----------	----------	25,003	----------	350	Other minerals.
Totals	[2]$1,407,391	[2]$41,130	[2]$790,518	----------	$301,611	

Grand total value, $2,540,650.

[1] Lawver, A. M., in 'Production of Precious Metals in U. S.': Report of Director of Mint, 1884, p. 175, 1885.
[2] See under 'Unapportioned.'
[3] Includes Modoc and Colusa Counties' production.
[4] Includes Colusa County production.
[5] Copper production erroneously reported from Lassen County in the years 1913 and 1914, on account of shipping point being Doyle, while producing copper mines were located in Plumas County.

MINERAL PRODUCTION OF LASSEN COUNTY, 1880-1943

Year	Gold, value	Silver, value	Miscellaneous stone, value	Miscellaneous and unapportioned		
				Amount	Value	Substance
880	$25,900	-----	-----	-----	-----	
881	71,000	$1,000	-----	-----	-----	
882	100,000	20,000	-----	-----	-----	
883	20,000	5,000	-----	-----	-----	
884	[1]119,060	341	-----	-----	-----	
885	15,000	150	-----	-----	-----	
886	25,812	135	-----	-----	-----	
887	24,108	304	-----	-----	-----	
888	50,000	200	-----	-----	-----	
889	97,503	215	-----	-----	-----	
890	14,890	300	-----	-----	-----	
891	3,676	-----	-----	-----	-----	
892	15,400	-----	-----	-----	-----	
893	-----	-----	-----	-----	-----	
894	35,283	-----	-----	-----	-----	
895	25,000	-----	-----	-----	-----	
896	40,300	-----	-----	-----	-----	
897	49,100	850	-----	-----	-----	
898	37,460	300	-----	-----	-----	
899	28,898	-----	-----	-----	-----	
900	19,807	676	-----	-----	-----	
901	5,900	200	-----	-----	-----	
902	23,410	244	-----	-----	-----	
903	91,102	1,203	-----	-----	-----	
904	116,993	1,515	-----	-----	-----	
905	-----	-----	-----	-----	-----	
906	[2]	[2]	-----	-----	-----	
907	[2]	[2]	-----	-----	-----	
908	7,284	783	-----	-----	-----	
909	[3]116,327	[3]1,463	-----	-----	$217,521	Unapportioned, 1900-1909.
910	[4]82,180	[4]492	-----	-----	-----	
911	[2]	[2]	-----	-----	1,522	Gold and silver.
912	-----	-----	-----	-----	-----	
913	-----	2	$2,030	-----	-----	[5]
914	1,250	4	775	-----	-----	[5]
915	-----	-----	870	-----	-----	
916	-----	-----	9,725	-----	-----	
917	-----	-----	376	-----	-----	
918	-----	-----	800	-----	-----	
919	-----	-----	1,100	-----	-----	
920	-----	-----	7,313	-----	5,000	Other minerals.
921	39,943	1,234	42,308	-----	-----	
922	[2]	[2]	9,540	-----	17,877	Brick, gold and silver.[4]
923	[2]	[2]	7,600	-----	240	Gold and silver.
1924	2,250	44	35,614	-----	-----	
1925	1,130	24	1,250	-----	-----	
1926	67	1	18,995	-----	-----	
1927	531	9	47,885	-----	1,000	Granite curbing.
1928	492	8	73,399	1,550 cu.ft.	2,600	Granite.
1929	168	2	88,328	-----	200	Other minerals.
1930	2,946	23	14,600	-----	525	Other minerals.
1931	241	2	-----	-----	1,600	Other minerals.
1932	460	3	109,105	-----	-----	
1933	8,309	68	35,228	-----	2,094	Copper, granite, lead.
1934	14,689	278	[2]	304 lbs.	24	Copper.
				-----	13,327	Other minerals.
1935	12,182	285	8,728	-----	537	Other minerals.
1936	31,010	1,815	32,956	-----	502	Other minerals.
1937	21,175	1,133	63,257	-----	675	Other minerals.
1938	[2]	[2]	58,118	-----	428	Gold, granite, silver.
1939	3,325	241	42,711	-----	-----	
1940	2,695	59	11,962	-----	152	Copper, granite.
1941	2,135	44	39,942	-----	201	Copper, granite.
1942	-----	-----	[2]	-----	35,236	Granite, miscellaneous stone.
1943	-----	-----	25,003	-----	350	Other minerals.
Totals	[2]$1,407,391	[2]$41,130	[2]$790,518	-----	$301,611	

Grand total value, $2,540,650.

[1] Lawver, A. M., in 'Production of Precious Metals in U. S.': Report of Director of Mint, 1884, p. 175, 1885.
[2] See under 'Unapportioned.'
[3] Includes Modoc and Colusa Counties' production.
[4] Includes Colusa County production.
[5] Copper production erroneously reported from Lassen County in the years 1913 and 1914, on account of shipping p t being Doyle, while producing copper mines were located in Plumas County.

MINERAL PRODUCTION OF

Year	Gold, value	Silver, value	Copper		Brick	
			Pounds	Value	M	Value
1893	[1]$150,696	$314				
1894	107,791	180				
1895	162,323					
1896	104,339	1,240				
1897	85,963					
1898	94,884	50			400	$2,800
1899	73,758	292			439	3,070
1900	104,134	3,833	500,000	$77,500	500	3,000
1901	82,749	2,600	108,430	17,077	500	3,000
1902	35,128	3	18,600	2,139	230	1,840
1903	93,070	3	36,000	4,680	216	972
1904	75,303	25	10,300	1,313	750	3,750
1905	50,867	10,014				
1906	22,390	508				
1907	13,303	506	1,895	379	1,250	12,50
1908	45,107	1,264	113,293	15,454	250	2,25
1909	14,716	403	5,000	635		
1910	10,076	850	336,667	42,876	740	3,70
1911	1,958	77	14,608	1,826	270	1,35
1912	9,162	1,162	248,129	40,941	300	1,50
1913	14,489	1,617	532,403	82,522	315	1,65
1914	4,506	36	35,359	4,703		
1915	11,214	2,126	40,294	7,051	200	1,40
1916	10,306	1,772	124,286	30,574		
1917	18,914	489	372,123	101,590		
1918	7,583	4,206	245,519	60,643		
1919	17,705	1,700	175,405	32,625		
1920	6,382	1,488	89,846	16,532		
1921	1,053	27				
1922	1,594	3,500				
1923	12,074	541				
1924	3,208	176	34,467	4,515		
1925	2,366	82				
1926	1,708	22				
1927	4,181	38				
1928	3,580	144	14,171	2,031		
1929	1,474	475	19,254	3,389		
1930	1,062	70	98	13		
1931	2,405	11				
1932	9,230	52				
1933	8,962	712	496	32		
1934	13,165	69				
1935	21,410	83				
1936	23,485	180				
1937	13,615	110	2,007	243		
1938	9,485	56				
1939	30,135	181				
1940	49,000	340				
1941	52,395	335				
1942	25,095	172	64,988	7,864		
1943	350	91	21,940	8,552		
Totals	$1,717,848	$45,225	3,165,578	$561,954	6,360	$42,7

Grand total value, $15,244,317.

[1] Madera County created March 11, 1893, from a portion of Fresno County. Between 80 per cent and 90 per cent the gold and silver produced in Fresno County prior to 1893 was from that part now in Madera County.
[2] Includes crushed rock, rubble, rip-rap, sand, gravel.
[3] See under 'Unapportioned.'

MADERA COUNTY, 1893[1]-1943

Granite		Miscellaneous stone[2], value	Miscellaneous and unapportioned		
Cubic feet	Value		Amount	Value	Substance
------	------	------	------	------	
48,858	$31,494	------	------	------	
39,590	49,662	------	------	------	
48,628	73,525	$7,800	------	------	
39,030	37,215	1,249	------	------	
23,103	49,673	500	------	------	
47,433	36,000	2,500	------	------	
124,015	80,000	------	------	$65,000	Unapportioned, 1900-1909.
96,716	294,799	600	------	------	
105,845	78,041	4,000	------	------	
128,581	389,800	1,000	------	------	
113,627	98,083	500	------	------	
42,316	123,106	------	------	------	
65,472	176,416	------	------	------	
99,278	93,372	------	------	------	
140,086	123,668	2,140	2,279 lbs.	84	Lead.
142,622	111,380	5,836	------	------	
99,192	74,152	1,112	------	------	
99,900	74,190	800	------	------	
82,135	56,058	3,213	5,533 lbs.	249	Lead.
150,994	270,123	1,466	------	------	
------	186,543	6,221	50 tons	1,000	Pumice.
------	84,632	37,640	------	1,000	Other minerals.
128,865	172,191	7,915	------	------	
------	114,400	1,525	221 lbs.	19	Lead.
------	40,355	1,540	------	------	
------	64,358	1,500	------	------	
------	98,523	------	------	------	
------	461,822	4,765	------	------	
------	454,222	16,948	------	------	
------	486,670	------	------	18,750	Other minerals.
------	935,820	11,750	------	------	
------	1,358,410	16,600	------	------	
------	418,683	5,325	------	------	
------	[3]	[3]	------	1,055,447	Granite paving blocks and miscellaneous stone.
[3]	------	[3]	------	508,740	Granite and miscellaneous stone.
[3]	------	[3]	------	1,022,072	Granite and miscellaneous stone.
[3]	------	[3]	4,933 lbs.	250	Lead.
			------	674,387	Granite and miscellaneous stone.
[3]	------	2,015	------	483,912	Other minerals.
[3]	------	[3]	------	288,739	Granite and miscellaneous stone.
[3]	------	[3]	5,442 lbs.	210	Lead.
			------	123,198	Granite, miscellaneous stone, volcanic ash.
[3]	------	53,590	------	197,320	Granite and volcanic ash.
[3]	------	54,871	------	230,280	Granite, lead, volcanic ash.
[3]	------	44,020	------	154,907	Granite, volcanic ash.
[3]	------	70,502	------	48,695	Granite, pumice, volcanic ash.
------	------	2,875	------	17,500	Other minerals.
[3]	------	[3]	------	89,515	Granite, miscellaneous stone, volcanic ash.
[3]	------	22,549	2,860 lbs.	143	Lead.
			------	38,042	Granite, pumice, volcanic ash.
[3]	------	------	------	127,600	Granite, pumice, miscellaneous stone, volcanic ash, tungsten.
[3]	------	[3]	------	54,596	Granite, volcanic ash, miscellaneous stone.
------	------	[3]	------	52,282	Natural gas, volcanic ash, miscellaneous stone, tungsten.
------	[3]$7,197,386	[3]$394,867	------	$5,284,253	

MINERAL PRODUCTION OF

Year	Brick		Miscellaneous stone[1]	
	M	Value	Tons	Value
1888	1,600	$10,000		
1889	*2,000	12,000		
1890	*5,000	30,000		
1891	*10,000	60,000		
1892	*12,000	72,000		
1893	18,000	108,000		
1894	28,500	172,500		$16,850
1895	29,000	145,000		7,790
1896	15,000	85,000	7,849	8,260
1897	15,000	89,000	6,000	7,200
1898	15,500	66,000	1,710	1,800
1899	16,500	76,000	4,400	5,150
1900	25,000	200,000	3,000	2,500
1901	14,320	100,240	34,000	27,987
1902	14,600	97,700	149,450	105,350
1903	13,819	78,095	144,715	140,332
1904	20,500	132,000	216,576	170,995
1905	22,877	163,585	113,000	44,250
1906	23,900	199,300	54,000	53,000
1907	16,000	118,000	157,100	134,111
1908	10,000	50,000	111,686	66,700
1909	4,500	105,000	132,010	67,010
1910	22,497	99,185	112,000	74,700
1911	19,695	87,445	173,646	108,786
1912	18,000	88,200	5,300	3,000
1913	16,000	70,500	428,357	198,953
1914	15,000	55,000		490,137
1915	10,000	50,000		101,528
1916	[2]			74,000
1917	[2]			158,582
1918	[2]			89,458
1919	[2]			127,111
1920	[2]			208,302
1921	[2]			202,333
1922	[2]		[2]	[2]
1923	[2]			516,936
1924	[2]			356,035
1925	[2]			244,602
1926	[2]			413,712
1927	[2]			381,256
1928	[2]			309,218
1929	[2]		[2]	[2]
1930	[2]		[2]	[2]
1931	[2]		[2]	[2]
1932	[2]			189,937
1933	[2]		[2]	[2]
1934	[2]			136,127
1935	[2]			98,663
1936	[2]			[2]
1937				296,844
1938				[2]
1939				120,256
1940				[2]
1941				[2]
1942				[2]
1943				[2]
Totals	[2]434,808	$2,619,750		[2]$5,759,761

Grand total value, $13,426,367.

* Estimated.
[1] Includes crushed rock, rubble, rip-rap, sand, gravel.
[2] See under 'Unapportioned.'

RIN COUNTY, 1888-1943

Mineral water		Miscellaneous and unappropriated		
Gallons	Value	Amount	Value	Substance
----------	----------	----------	----------	
----------	----------	----------	----------	
----------	----------	----------	----------	
----------	----------	----------	----------	
----------	----------	----------	----------	
----------	----------	----------	----------	
----------	----------	----------	----------	
----------	----------	7,000 cu. ft.	$5,000	Granite.
----------	----------	----------	----------	
----------	----------	----------	----------	
----------	----------	----------	----------	
----------	----------	----------	----------	
----------	----------	----------	----------	
----------	----------	----------	----------	
----------	----------	700 tons	1,400	Salt.
----------	----------	----------	----------	
----------	----------	----------	----------	
----------	----------	----------	----------	
----------	----------	150 tons	300	Salt.
----------	----------	----------	----------	
52,000	$12,050	----------	----------	
47,500	5,075	----------	42,000	Unapportioned, 1900-1909.
100,000	10,000	----------	----------	
328,740	36,500	----------	----------	
260,000	31,000	----------	----------	
60,000	9,000	----------	----------	
60,000	9,000	----------	----------	
60,000	9,000	----------	----------	
[2]	----------	----------	74,000	Brick and mineral water.
[2]	----------	----------	113,720	Brick and mineral water.
[2]	----------	----------	86,725	Brick, copper, gold, mineral water, silver.
[2]	----------	----------	101,863	Brick and mineral water.
[2]	----------	----------	127,443	Brick and mineral water.
[2]	----------	----------	116,443	Brick and mineral water.
[2]	[2]	----------	403,099	Brick, mineral water, potash, miscellaneous stone.
----------	----------	----------	171,945	Brick, clay, mineral water.
----------	----------	----------	171,196	Brick, pottery clay, mineral water.
[2]	----------	----------	190,200	Brick, clay and mineral water.
[2]	----------	----------	113,841	Brick and mineral water.
[2]	----------	----------	145,748	Brick and mineral water.
[2]	----------	----------	140,350	Brick and mineral water.
[2]	----------	----------	470,002	Brick, mineral water, miscellaneous stone.
[2]	----------	----------	405,541	Brick, mineral water, miscellaneous stone.
----------	----------	----------	544,760	Brick, miscellaneous stone.
[2]	----------	----------	63,900	Brick and mineral water.
[2]	----------	----------	205,150	Brick, clay (pottery), mineral water, miscellaneous stone.
[2]	----------	----------	47,227	Brick and mineral water.
[2]	----------	----------	15,251	Brick, jasper, mineral water.
[2]	----------	----------	113,914	Brick, mineral water, miscellaneous stone.
----------	----------	----------	3,360	Other minerals.
[2]	----------	----------	189,843	Pottery clay, mineral water, miscellaneous stone.
[2]	----------	----------	13,500	Pottery clay, mineral water.
[2]	----------	----------	151,800	Mineral water, miscellaneous stone.
[2]	----------	----------	186,322	Pottery clay, mineral water, miscellaneous stone.
[2]	----------	----------	229,269	Pottery clay, manganese ore, mineral water, miscellaneous stone.
[2]	----------	----------	280,119	Pottery clay, manganese ore, mineral water, miscellaneous stone.
[2]962,240	$121,625	----------	$4,925,231	

MINERAL PRODUCTION OF MARIPOSA COUNTY, 1880-1943

Year	Gold, value	Silver, value	Copper		Miscellaneous and unapportioned		
			Pounds	Value	Amount	Value	Substance
1880	$150,017	$1,300					
1881	200,000	1,200					
1882	250,000	4,000					
1883	220,000	3,000					
1884	180,000						
1885	149,177	100					
1886	197,600						
1887	187,165	96					
1888	175,000	250					
1889	145,819	210					
1890	124,265	22					
1891	84,414						
1892	81,011	67					
1893	164,116	307					
1894	153,708	39					
1895	216,622	7					
1896	335,637	180					
1897	451,427	660					
1898	336,418	993					
1899	562,829	2,207			110 sq'r's	$600	Slate.
1900	157,663	13,853					
1901	504,928	4,787	191,622	$30,180	70,000 lbs.	3,080	Lead.
1902	631,478	3,880	104,700	11,940			
1903	542,355	3,353	61,627	6,808			
1904	429,771	2,839	11,500	1,466			
1905	386,380	5,231	12,541	1,956		25	Platinum.
1906	366,394	3,377					
1907	405,498	4,500			1,142 lbs.	60	Lead.
1908	439,862	4,732	29,124	2,958		36,560	Miscellaneous stone.
1909	396,465	2,729				62,430	Miscellaneous stone.
						8,431	Unapportioned, 1900-1909.
1910	317,580	2,364				21,501	Miscellaneous stone.
					800 tons	4,800	Barytes.
1911	172,532	1,390	14,641	1,830			
1912	160,541	6,796	284,587	46,957			
1913	171,034	7,430	416,031	64,485		3,130	Other minerals.
1914	131,458	677	277,472	36,904		15,366	Miscellaneous stone.
					2,000 tons	3,000	Barytes.
					100 cu. ft.	100	Marble.
1915	385,577	2,175	38,630	6,760		17,214	Miscellaneous stone.
						600	Other minerals.
1916	401,718	2,680	162,318	39,930	1,857 lbs.	128	Lead.
						4,143	Other minerals.
						39,372	Miscellaneous stone.
1917	313,296	3,221	53,381	14,583	1,075 lbs.	92	Lead.
						13,399	Other minerals.
						7,646	Miscellaneous stone.
1918	337,682	5,083	30,294	7,483		1,856	Chromite and lead.
						400	Miscellaneous stone.
1919	253,392	4,139	24,879	4,627		8	Other minerals.
						400	Miscellaneous stone.
1920	261,830	4,705	[1]			4,096	Barytes, copper, lead.
						400	Miscellaneous stone.
1921	331,295	5,251				5,655	Barytes and pyrites.
						400	Miscellaneous stone.
1922	218,571	3,301				4,960	Barytes, pyrites and miscellaneous stone.
1923	141,883	1,735				27,293	Barytes, pyrites and miscellaneous stone.
1924	182,099	1,608				3,000	Other minerals.
						48,000	Miscellaneous stone.
1925	192,810	1,758				3,500	Other minerals.
						436,794	Miscellaneous stone.
1926	182,313	1,518				130,804	Miscellaneous stone.
						5,089	Barytes, copper and pyrites.
1927	183,805	1,376				2,000	Granite.
						259,677	Miscellaneous stone.
						53,020	Barytes, pyrite, slate.

MINERAL PRODUCTION OF MARIPOSA COUNTY, 1880-1943—Continued

Year	Gold, value	Silver, value	Copper		Miscellaneous and unapportioned		
			Pounds	Value	Amount	Value	Substance
928	$120,568	$2,199	[1]	----------	----------	$13,988	Granite.
					3,728 tons	21,776	Silica.
					----------	68,037	Miscellaneous stone.
					----------	55,597	Barite, copper.
929	91,052	651	6,302	$1,109	----------	64,966	Miscellaneous stone.
					----------	86,239	Barite, silica.
930	58,985	318	3,629	472	----------	15,133	Miscellaneous stone.
					----------	68,557	Barite, granite, lead.
931	88,600	551	[1]	----------	----------	33,410	Miscellaneous stone.
					----------	71,080	Barite, copper, granite, lead, silica.
932	169,627	636	[1]	----------	----------	131,625	Miscellaneous stone.
					----------	77,366	Barite, copper, granite, lead.
933	254,663	1,112	[1]	----------	----------	280,016	Miscellaneous stone.
					----------	39,327	Barite, copper, granite.
934	517,443	3,214	1,771	142	----------	185,960	Miscellaneous stone.
					----------	101,149	Barite, granite, lead.
935	514,544	4,913	2,252	187	1,438 lbs.	57	Lead.
					----------	178,266	Miscellaneous stone.
					----------	175,275	Barite, granite.
936	863,485	4,756	2,350	216	----------	160,451	Miscellaneous stone.
					----------	101,110	Barite, lead, granite.
937	1,025,010	6,084	11,927	1,443	----------	65,283	Miscellaneous stone.
					----------	172,954	Barite, granite, lead, mica, schist, pumice.
938	1,081,815	5,154	4,328	424	----------	282,030	Miscellaneous stone.
					----------	219,438	Barite, granite.
939	1,296,155	13,181	3,810	396	50,357 lbs.	2,367	Lead.
					----------	239,197	Miscellaneous stone.
					----------	204,480	Barite, granite.
1940	949,640	6,615	7,616	861	27,725 lbs.	1,386	Lead.
					----------	109,598	Miscellaneous stone.
					----------	156,186	Other minerals.
1941	1,141,070	7,183	5,908	697	7,183 lbs.	416	Lead.
					----------	45,363	Miscellaneous stone.
					----------	132,865	Barite, mica schist.
1942	1,025,220	6,840	26,973	3,264	15,782 lbs.	1,057	Lead.
					----------	284,857	Barite, silica (quartz), manganese ore, miscellaneous stone.
1943	227,115	1,231	[1]	----------	----------	4,120	Miscellaneous stone.
					----------	211,227	Barite, copper, lead, manganese ore, silica (quartz), tungsten.
Totals	$22,390,427	$185,774	[1]1,790,213	$287,078	----------	$5,282,238	

Grand total value, $28,146,517.

[1] See under 'Unapportioned.'

MINERAL PRODUCTION OI

Year	Brick		Manganese ore	
	M	Value	Tons	Value
1880				
1881				
1882				
1895				
1896				
1898	258	$1,080		
1899	200	1,800		
1900	25	400		
1901	200	2,500		
1902	200	2,000		
1903	550	5,580		
1904	260	3,120		
1905	635	6,470		
1906	500	5,000		
1907	400	4,000		
1908	260	2,600		
1909	150	1,500		
1910				
1911	160	1,600		
1912				
1913				
1914				
1915			2,858	$23,03
1916			1,735	43,0
1917	[2]		1,541	40,51
1918			1,432	58,9
1919				
1920				
1921	[2]		[2]	
1922	[2]			
1923				
1924	550	7,125		
1925	[2]			
1926				
1927	[2]			
1928				
1929	[2]			
1930	[2]			
1931				
1932				
1933				
1934				
1935				
1936				
1937				
1938				
1939				
1940				
1941				
1942			[2]	
1943			[2]	
Totals	[2]4,348	$44,775	[2]7,566	$165,5

Grand total value, $1,816,033.

1 Includes crushed rock, rubble, rip-rap, sand, gravel,

2 See under 'Unapportioned.'

MENDOCINO COUNTY, 1880-1943

Mineral water		Miscellaneous stone[1], value	Miscellaneous and unapportioned		
Gallons	Value		Amount	Value	Substance
				$733	Gold.
				125	Silver.
				1,000	Gold.
			50 tons	150	Coal.
			450 tons	2,250	Bituminous rock.
17,470	$6,988				
24,875	8,048				
27,950	8,220				
28,575	7,898				
38,900	15,000				
40,000	12,000			75	Gold.
90,000	18,000			40	Gold.
40,000	9,800			19	Gold.
			50 flasks	1,825	Quicksilver (1906).
45,000	9,800				
45,000	9,800				
45,000	9,000	$1,200		18,000	Unapportioned, 1900-1909.
		500			
		300			
		9,450			
		560			
		1,500			
		8,275	300 tons	2,400	Magnesite.
				2,000	Other minerals.
		5,600		4,300	Brick, chromite, magnesite.
		5,000		226	Gold, platinum.
			555 tons	44,200	Chromite.
		7,000		7,214	Chromite, platinum.
		7,500		18,610	Chromite, manganese, natural gas, platinum.
		40,000		1,509	Gold.
				13	Silver.
				3,200	Brick, manganese, natural gas, platinum.
		18,762		1,800	Brick, natural gas, platinum.
		48,360		5,050	Coal, natural gas.
		49,680		3,963	Coal, natural gas, platinum, manganese.
		11,603		4,930	Brick, coal, natural gas.
		15,750		50	Other minerals.
		44,630		3,040	Brick and natural gas.
		40,420		20	Other minerals.
		55,925		3,075	Brick, natural gas.
		119,429		3,633	Brick, limestone, natural gas.
		70,755		1,952	Other minerals.
		101,619		50	Other minerals.
		35,010		155	Gold.
				118	Limestone, natural gas.
		14,301		50	Other minerals.
		10,389		40	Other minerals.
		35,521		75	Other minerals.
		[2]		35,596	Natural gas and miscellaneous stone.
		[2]		114,705	Natural gas and miscellaneous stone.
		[2]		46,378	Carbon dioxide, natural gas, miscellaneous stone.
		107,507		70	Gold.
				1,533	Carbon dioxide and natural gas.
		43,809		30,184	Carbon dioxide, coal, natural gas, platinum.
		57,368		76,627	Carbon dioxide, chromite, manganese ore, natural gas, quicksilver.
		43,174		39,306	Carbon dioxide, chromite, manganese ore, natural gas.
442,770	$114,554	$1,010,897		$480,289	

MINERAL PRODUCTION OF MERCED COUNTY, 1880-1943

Year	Gold, value	Silver, value	Copper		Brick		Miscellaneous and unapportioned		
			Pounds	Value	M	Value	Amount	Value	Substance
1880	$17,515								
1881	1,500								
1882	10,000								
1883	10,000								
1884	6,500								
1885	10,000								
1886	7,000								
1887	10,767	$5							
1888	10,000								
1889	4,843								
1890	2,000	59							
1891	1,728	17							
1892	445								
1893									
1894	763								
1895	1,500								
1896	1,250								
1897									
1898									
1899									
1900	[1]								
1901	[1]		79,071	$12,453					
1902			14,400	1,656					
1903	[1]		6,000	780					
1904	[1]		8,900	1,135					
1905	[1]				600	$3,500			
1906					650	6,000			
1907	822	10			1,250	12,500			
1908	[2]182,970	[2]1,196	694	70	700	6,300	965 lbs.	$36	Lead.
1909	[2]228,492	[2]572			700	6,300		18,264	Unapportioned.
1910	[1]	[1]			700	6,300		64,764	Miscellaneous stone.
1911	[1]	[1]						49,548	Miscellaneous stone.
1912	[1]	[1]						45,000	Miscellaneous stone.
1913	[4]2,255	[4]92	19,240	2,982				30,000	Miscellaneous stone.
1914	[2]111,361	[2]340							
1915	[3]	[1]					690 lbs.	32	Lead.
								94,000	Other minerals.
1916	[3]	[3]					90 tons	720	Magnesite.
								80,810	Gold, platinum, silver
1917	[3]	[1]						70,500	Miscellaneous stone.
								76,616	Gold, platinum, silver
1918	41,089	254						32,500	Miscellaneous stone.
								1,006	Other minerals.
1919	[1]	[1]						40,350	Miscellaneous stone.
1920								24,800	Miscellaneous stone.
1921	3,163	87						30,300	Miscellaneous stone.
1922	[3]	[3]			[3]			88,110	Miscellaneous stone.
								69,469	Building tile, gold and silver.
1923	[3]	[3]			[3]			134,036	Miscellaneous stone.
								101,567	Brick, building tile, go and silver.
1924	355	1	[3]		[3]			14,262	Miscellaneous stone.
								72,933	Clay and clay produc
								52	Copper and lead.
1925	289	1			[3]			36,646	Miscellaneous stone.
								43,326	Clay and clay produc
1926					[3]			156,486	Miscellaneous stone.
								36,179	Clay and clay produc
1927					[3]			189,537	Miscellaneous stone.
								177,336	Brick, hollow buildi tile, cement, clay (p tery).

MINERAL PRODUCTION OF MERCED COUNTY, 1880-1943—Continued

Year	Gold, value	Silver, value	Copper		Brick		Miscellaneous and unapportioned		
			Pounds	Value	M	Value	Amount	Value	Substance
28	$310	$2	----	----	----	[3]	----	$652,875	Other minerals.[6]
29	84,188	186	----	----	----	[3]	----	1,026,124	Other minerals.[7]
30	88,328	146	----	----	----	[3]	----	29,250	Miscellaneous stone.
							----	684,176	Other minerals.[8]
31	173,551	226	----	----	----	----	----	534,012	Other minerals.[9]
32	391,017	525	----	----	----	----	----	22,500	Miscellaneous stone.
							----	335,700	Other minerals.[10]
33	451,023	610	----	----	----	----	----	13,875	Miscellaneous stone.
							----	300,506	Other minerals.[11]
34	598,695	1,051	----	----	----	----	----	38,643	Miscellaneous stone.
							----	412,103	Cement, gypsum, platinum.
35	1,302,369	2,761	----	----	----	----	----	14,750	Miscellaneous stone.
							----	384,895	Other minerals.
36	1,462,160	3,433	----	----	----	----	----	20,755	Miscellaneous stone.
							----	522,960	Cement, copper, lead, platinum.
37	1,858,815	4,274	----	----	----	----	----	36,157	Miscellaneous stone.
							----	635,880	Other minerals.
38	2,090,340	3,788	----	----	----	----	----	139,637	Miscellaneous stone.
							----	633,736	Other minerals.
39	1,781,325	3,219	----	----	----	----	----	827,352	Cement, miscellaneous stone, platinum.
40	1,816,745	3,478	----	----	----	----	----	694,100	Cement, miscellaneous stone, platinum.
41	1,550,955	3,237	----	----	----	----	----	101,687	Miscellaneous stone.
							----	924,105	Other minerals.
42	701,855	1,381	----	----	----	----	----	184,196	Miscellaneous stone.
							----	960,887	Other minerals.
43	2,835	20	----	----	----	----	----	1,115,458	Cement, platinum, miscellaneous stone.
Totals	$15,021,118	$30,971	128,305	$19,076	4,600	$40,900	----	$13,025,514	

Grand total value, $28,137,579.

1 Included with Stanislaus County production.
2 Includes Stanislaus County production.
3 See under 'Unapportioned.'
4 Dredge output included under Stanislaus County.
6 Includes brick and hollow building tile, cement, clay (pottery), miscellaneous stone.
7 Includes brick and hollow building tile, cement, miscellaneous stone.
8 Includes brick and hollow building tile, clay (pottery), lead.
9 Includes cement, copper, miscellaneous stone.
10 Includes cement, platinum, volcanic ash.
11 Includes cement, gypsum, platinum.

MINERAL PRODUCTION OF MODOC COUNTY, 1880-1943

Year	Gold, value	Silver, value	Salt		Miscellaneous stone[1], value	Miscellaneous and unapportioned		
			Tons	Value		Amount	Value	Substance
1880	$10,000							
1881	20,000	$1,500						
1882								
1883	50,000							
1884	60,000							
1885	60,000							
1886								
1909	[2]							
1910	5,438	75						
1911	19,875	363						
1912	27,893	494	50	$800				
1913	6,061	94	40	720				
1914	1,000	10	40	720				
1915	7,557	104	[3]		$300		$720	Other minerals.
1916	2,729	90	[3]		200		540	Other minerals.
1917					200			
1918	[3]	[3]	[3]		200		8,020	Gold, salt, silver.
1919	6,478	390	[3]		550		1,802	Other minerals.
1920	[3]	[3]	[3]		700		3,968	Gem material (Iceland Spar), gold, salt, silver.
1921			[3]		34,930		1,720	Gem material (Iceland Spar) and salt.
1922			[3]		[3]		16,018	Salt, miscellaneous stone.
1923	[3]	[3]	[3]		8,109		288	Gold, silver.
1924			[3]		[3]		1,300	Salt, miscellaneous stone.
1925							2,400	Salt, miscellaneous stone.
1926	158	3			36,450		1,380	Other minerals.
1927					61,651		600	Other minerals.
1928					29,440		1,000	Other minerals.
1929					30,346		650	Other minerals.
1930			[3]		[3]		16,250	Miscellaneous stone and salt.
1931	293	2			180,104		851	Other minerals.
1932	2,082	29	[3]		48,221		670	Gems and salt.
1933	1,346	13	[3]		164,614		774	Other minerals.
1934	6,323	67	[3]		41,150		577	Other minerals.
1935	84	8	[3]		51,550		790	Other minerals.
1936			[3]		30,249		2,057	Gems and salt.
1937	210	[3]	[3]		35,381		1,396	Gems and salt.
1938	[3]	[3]	[3]		4,329		1,567	Gems, gold, silver, salt, mineral water.
1939	245	[3]	[3]		17,449		5,961	Copper, gems, mineral water, salt, pumice.
1940	245	[3]	[3]		79,564		13,230	Gems, pumice, salt.
1941					105,218		20,209	Gems, pumice, quicksilver.
1942			[3]		49,778		3,552	Gems, pumice, salt.
1943					28,691			
Totals	[3]$288,017	$3,251	[3]130	$2,240	[3]$1,039,374		$108,290	

Grand total value, $1,441,172.

[1] Includes crushed rock, rubble, sand, gravel.
[2] Included under Lassen County production.
[3] See under 'Unapportioned.'

MINERAL PRODUCTION OF MONO COUNTY, 1880-1943

Year	Gold, value	Silver, value	Lead		Lime		Miscellaneous and unapportioned		
			Pounds	Value	Barrels	Value	Amount	Value	Substance
1880	$2,407,236	$582,905							
1881	3,385,000	300,000							
1882	2,200,000	380,000							
1883	1,750,000	290,000							
1884	1,000,000	285,000							
1885	482,860	91,849							
1886	439,558	163,502							
1887	382,498	118,945							
1888	297,000	75,000							
1889	193,264	86,827							
1890	144,180	52,293							
1891	302,415	18,983							
1892	396,296	271,058							
1893	293,637	11,401							
1894	358,824	11,549	50,000	$1,500					
1895	552,690	84,910	94,400	2,926			800 cu. ft.	$8,000	Onyx.
1896	451,553	82,283	73,500	2,205	500	$2,000	3,000 cu. ft.	24,000	Onyx.
1897	520,101	72,491	32,000	1,088	1,200	4,800			
1898	446,017	66,667	75,000	2,737	3,000	4,000			
1899	697,069	47,547	28,000	1,190	1,200	3,750			
1900	670,200	75,921	50,000	2,000	1,100	4,000			
1901	493,355	25,091	29,000	1,160	2,000	3,000	1,938 lbs.	305	Copper.
1902	510,596	36,548	4,400	154	2,000	2,000			
1903	334,713	20,067	1,000	36	1,818	5,000	1,600 lbs.	208	Copper.
1904	268,390	2,955			215	850			
1905	308,884	11,240							
1906	338,698	13,151							
1907	383,971	29,797							
1908	413,946	26,134					7,100 gals.	5,575	Mineral water.
1909	354,909	37,792						106,772	Unapportioned, 1900-1909.
1910	435,724	9,391							
1911	261,232	35,508	37,000	1,665					
1912	377,518	70,602	23,936	1,077	4,961	3,721	8,179 lbs.	1,350	Copper.
1913	147,271	23,263			2,135	1,600	79,319 lbs.	12,294	Copper.
1914	7,000	10,000					1,000 lbs.	150	Salt.
1915	107,302	1,923						200	Other minerals.
1916	237,084	3,606						300	Other minerals.
1917	209,040	5,662	1,912	164				3,906	Copper, molybdenu salt.
				Totals	20,129	$34,721			
					Miscellaneous stone, value [1]				
1918	31,252	22,727	1,318	94			160 lbs. 	40 750	Copper. Other minerals.
1919	29,428	55,558	1,556	82			539 lbs.	100	Copper.
1920	144,746	34,369	85,014	6,801		$1,000	3,215 lbs. 	592 750	Copper. Other minerals.
1921	37,754	15,160	42,962	1,933			2,940 lbs. 	379 1,650	Copper. Onyx and salt.
1922	65,747	11,686	9,820	540			4,338 lbs. 	586 8,304	Copper. Other minerals.
1923	34,661	3,120				10,000		45,010	Other minerals.
1924	49,651	6,472	32,458	2,597		19,044		48,927	Other minerals.
1925	5,503	1,590	22,488	1,957		29,250		146,300	Other minerals.
1926	20,204	121,404	20,906	1,672			2,628 lbs. 	368 66,200	Copper. Other minerals.
1927	3,686	21,822	4,830	304				76,375	Other minerals, cl copper, pumi salt, andalusit miscellaneoussto
1928	6,307	176,115						31,998	Clay (pottery), pu ice, volcanic a salt, travertine.
1929	10,025	28,137	19,602	1,235		15,257	16,552 lbs. 	2,913 161,263	Copper. Andalusite, clay (p tery), pumice, v canic ash, salt.
1930	26,234	3,166				19,770	2,006 lbs. 	216 99,553	Copper. Andalusite and pu ice.
1931	125,342	5,372	137	5		48,259		23,945	Pumice and salt.
1932	26,333	5,292	33,401	1,002		64,942	3,970 lbs. 	250 37,861	Copper. Andalusite and pu ice.

MINERAL PRODUCTION OF MONO COUNTY, 1880-1943—Continued

Year	Gold, value	Silver, value	Lead		Miscellaneous stone,[1] value	Miscellaneous and unapportioned		
			Pounds	Value		Amount	Value	Substance
1933	$33,378	$1,004	5,537	$170	$20,354	665 lbs.	$43	Copper.
						------------	26,198	Andalusite and pumice.
1934	56,092	20,205	7,487	277	77,806	510 lbs.	41	Copper.
						------------	58,017	Gems (rutile), molybdenum ore, pumice, salt, andalusite.
1935	39,994	72,634	6,305	252	38,032	1,295 lbs.	107	Copper.
						------------	72,729	Unapportioned.
1936	64,120	329,245	16,805	773	18,452	6,748 lbs.	621	Copper.
						------------	85,640	Pumice, andalusite.
1937	182,105	488,347	12,938	763	87,253	13,216 lbs.	1,599	Copper.
						------------	44,858	Unapportioned.
1938	117,390	142,854	6,039	278	4,121	3,050 lbs.	299	Copper.
						------------	84,574	Andalusite, pottery clay pumice, tungsten.
1939	221,795	59,243	---------	---------	112,534	------------	119,785	Andalusite, pumice, quicksilver, salt, tungsten.
1940	427,490	104,307	140,666	7,033	37,372	113,870 lbs.	12,868	Copper.
						------------	77,260	Pottery clay, pumice, salt, tungsten.
1941	332,675	21,606	14,400	821	16,809	960 lbs.	113	Copper.
						------------	162,523	Pumice, andalusite, tungsten.
1942	64,155	11,080	[2]	---------	1,849	------------	63,662	Andalusite, copper, lead, manganese, pumice, tungsten.
1943	280	426	4,034	303	3,665	10,170 lbs.	1,322	Copper.
						------------	50,209	Andalusite, pumice, tungsten.
Totals	$24,716,918	$5,304,773	[2]988,851	$40,794	$625,719	------------	$2,120,193	

Grand total value, $32,849,118.
[1] Includes crushed rock, rubble, rip-rap, sand, gravel.
[2] Under 'Unapportioned.'

MINERAL PRODUCTION OF

Year	Gold, value	Silver, value	Brick		Diatomaceous earth		Lime		Limestone	
			M	Value	Tons	Value	Barrels	Value	Tons	Value
1889	$3,500									
1890	11,815									
1891										
1892										
1893										
1894	8,000									
1895										
1896										
1897									2,000	$2,000
1898			400	$2,400					2,049	1,640
1899			200	1,400					7,744	6,970
1900			200	1,600					8,000	10,800
1901	13,800								5,463	7,500
1902	6,860	$18					22,000	$13,200		
1903	8,920						26,000	23,400	6,516	9,000
1904	6,941		200	1,600			3,240	3,240	4,550	21,500
1905	4,000						10,000	10,000		
1906	625	3			80	$400	40,000	50,000		
1907	1,076	9					100,000	125,000		
1908	1,318	9	426	3,838			50,000	50,000		
1909	333	5	300	2,900	500	3,500	50,006	62,507	10,658	45,678
1910	[2]1,013	10	993	9,957	500	3,500	30,894	29,349	2,500	7,500
1911					850	5,950			2,000	6,000
1912	[3]7,647	67							6,000	8,000
1913	6,491	27			1,700	6,800			6,500	13,000
1914	4,000	20								
1915					[4]					
1916					[4]					
1917					[4]				[4]	
1918					[4]					
1919					[4]					
1920					[4]					
1921					[4]					
1922										
1923					[4]					
1924					[4]					
1925	998	3			[4]					
1926	706	3			[4]					
1927	500	2			[4]					

MONTEREY COUNTY, 1889-1943

Mineral water		Glass sand		Miscellaneous stone[1], value	Miscellaneous and unapportioned		
Gallons	Value	Tons	Value		Amount	Value	Substance
---------	---------	---------	---------	---------	---------	---------	
---------	---------	---------	---------	---------	---------	---------	
---------	---------	---------	---------	---------	---------	---------	
---------	---------	---------	---------	---------	---------	---------	
---------	---------	---------	---------	---------	---------	---------	
---------	---------	---------	---------	$1,500	---------	---------	
---------	---------	---------	---------	---------	---------	---------	
5,000	$1,000	---------	---------	---------	---------	---------	
2,000	200	---------	---------	---------	---------	---------	
21,000	1,050	---------	---------	14,025	---------	---------	
1,500	750	---------	---------	8,258	---------	---------	
20,000	4,000	---------	---------	2,775	---------	---------	
15,000	3,250	4,500	$15,750	8,869	200 tons	$1,000	Coal.
15,000	1,750	4,500	12,225	5,200	---------	---------	
55,000	1,250	5,989	4,967	3,167	61 tons	732	Asphaltum.
25,000	1,000	8,295	7,272	---------	124 tons	1,488	Asphaltum.
5,000	1,000	9,257	8,127	---------	---------	---------	
24,000	12,000	750	1,125	---------	---------	---------	
120,000	12,000	11,065	8,178	---------	4,800 tons	24,000	Coal.
---------	---------	6,805	5,120	31,727	7 flasks	296	Quicksilver.
10,000	2,000	6,496	4,872	43,351	1 flask ---------	49 344,789	Quicksilver. Unapportioned, 1900-1909.
---------	---------	7,594	5,890	47,487	7 flasks 700 tons 200 tons	317 5,000 2,500	Quicksilver. Feldspar. Fuller's earth.
---------	---------	---------	---------	27,011	11,000 tons	4,950	Clay.
20,000	7,000	9,016	7,916	60,119	4,000 tons	6,000	Clay.
20,000	7,000	9,141	9,192	12,556	320 tons --------- 35,000 tons 300 tons	3,200 78,332 12,000 2,700	Coal. Other minerals. Clay. Fuller's earth.
26,000	7,900	9,210	7,633	39,202	5,992 tons --------- 700 tons 450 tons	17,976 9,450 3,500 3,150	Coal. Other minerals. Feldspar. Fuller's earth.
8,200	2,050	[4]	---------	32,799	---------	50,137	Coal, feldspar, diatomaceous earth quicksilver, silica.
5,900	590	---------	---------	58,623	---------	50,659	Barytes, feldspar, diatomaceous earth, quicksilver, salt, silica.
---------	---------	[4]	---------	57,810	6,392 tons ---------	23,468 57,508	Dolomite. Barytes, diatomaceous earth, limestone, mineral water, quicksilver, salt, silica.
---------	---------	[4]	---------	52,697	4,900 tons 700 tons ---------	25,950 3,800 37,240	Dolomite. Feldspar. Barytes, coal, diatomaceous earth, quicksilver, salt, silica.
---------	---------	[4]	---------	73,031	8,280 tons ---------	29,120 43,353	Dolomite. Barytes, coal, feldspar, diatomaceous earth, salt, silica.
200	20	[4]	---------	[5]84,056	5,755 tons ---------	26,238 16,135	Dolomite. Barytes, coal, feldspar, diatomaceous earth, salt, silica (glass sand).
---------	---------	[4]	---------	[5]63,316	2,500 tons ---------	8,750 98,089	Dolomite. Asbestos, coal, diatomaceous earth, mineral water, salt, glass sand.
[4]	---------	[4]	---------	[5]86,180	---------	169,139	Asbestos, coal, dolomite, quicksilver, salt, glass sand.
[4]	---------	[4]	---------	[5]140,724	---------	81,298	Asbestos, diatomaceous earth, dolomite, mineral water, quicksilver, salt, glass sand.
[4]	[4]	---------	---------	239,847	238 tons 1,240 tons ---------	436 4,960 41,247	Clay (pottery). Dolomite. Diatomaceous earth, mineral water, quicksilver, salt, shale, building stone, silica (glass sand).
---------	[4]	---------	---------	409,423	414 tons ---------	1,161 66,136	Clay (pottery). Diatomaceous earth, quicksilver, salt, shale, building stone, silica (glass sand).
---------	[4]	---------	---------	263,244	491 tons ---------	1,164 94,876	Clay (pottery). Diatomaceous earth, dolomite, salt, sandstone (shale building stone), silica (glass sand).
---------	[4]	---------	---------	244,584	1,100 tons ---------	550 105,413	Clay (pottery). Diatomaceous earth, dolomite, building stone (andesite, sandstone), quicksilver, salt.

MINERAL PRODUCTION OF

Year	Gold, value	Silver, value	Brick		Diatomaceous earth		Lime		Limestone	
			M	Value	Tons	Value	Barrels	Value	Tons	Value
1928	-------	-------	-------	-------	[4]	-------	-------	-------	-------	-------
1929	$263	1	-------	-------	[4]	-------	-------	-------	-------	-------
1930	-------	-------	-------	-------	[4]	-------	-------	-------	-------	-------
1931	148	1	-------	-------	[4]	-------	-------	-------	-------	-------
1932	794	1	-------	-------	[4]	-------	-------	-------	-------	-------
1933	195	-------	-------	-------	[4]	-------	-------	-------	-------	-------
1934	517	1	-------	-------	[4]	-------	-------	-------	-------	-------
1935	297	1	-------	-------	[4]	-------	-------	-------	-------	-------
1936	[4]	-------	-------	-------	[4]	-------	-------	-------	-------	-------
1937	1,960	3	-------	-------	[4]	-------	-------	-------	-------	-------
1938	2,135	3	-------	-------	[4]	-------	-------	-------	-------	-------
1939	[4]	[4]	-------	-------	[4]	-------	-------	-------	-------	-------
1940	[4]	[4]	-------	-------	[4]	-------	-------	-------	-------	-------
1941	595	5	-------	-------	[4]	-------	-------	-------	-------	-------
1942	-------	-------	-------	-------	[4]	-------	-------	-------	-------	-------
1943	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
Totals	[4]$98,447	[4]$191	2,719	$23,695	[4]3,630	$20,150	332,140	$366,696	[4]63,980	$139,588

Grand total value, $9,875,750.

[1] Includes crushed rock, rubble, sand, gravel.
[2] Includes Monterey, San Luis Obispo and Santa Cruz Counties.
[3] Includes Los Angeles and San Luis Obispo Counties.
[4] See under 'Unapportioned.'
[5] Includes molding, building, blast, filter, roofing sand.

MONTEREY COUNTY, 1889-1943—Continued

Mineral water		Glass sand		Miscellaneous stone[1], value	Miscellaneous and unapportioned		
Gallons	Value	Tons	Value		Amount	Value	Substance
------	------	------	------	$210,489	94,700 cu. ft.	$22,200	Sandstone (shale building stone).
					------	118,971	Clay (pottery), diatomite, dolomite, salt.
------	------	[4]	------	213,082	------	11,900	Sandstone (shale building stone).
					------	129,612	Clay (pottery), diatomite, dolomite, glass sand, salt.
------	------	[4]	------	233,971	------	30,500	Sandstone (shale building stone).
					------	188,503	Asbestos, clay (pottery), diatomite, dolomite, glass sand, paving blocks, quicksilver, salt.
------	------	[4]	------	155,098	------	26,480	Sandstone (shale building stone).
					------	141,744	Clay (pottery), dolomite, glass sand, coal, silica.
------	------	[4]	------	95,802	------	10,560	Sandstone (shale building stone).
					------	59,140	Coal, diatomite, natural gas, glass sand, salt.
------	------	[4]	------	64,107	------	49,738	Clay (pottery), coal, diatomite, glass sand, dolomite, natural gas, quicksilver.
------	------	[4]	------	101,652	------	88,732	Clay (pottery), coal, diatomite, dolomite, natural gas, quicksilver, salt, sandstone, silica (glass sand).
------	------	------	------	61,261	------	4,370	Sandstone.
					------	66,760	Coal, diatomite, dolomite, jasper, natural gas, petroleum, quicksilver, salt.
------	------	------	------	130,590	18 flasks	1,373	Quicksilver.
					------	55,787	Diatomite, dolomite, gems, gold, natural gas, salt, sandstone.
------	------	[4]	------	206,700	------	53,988	Diatomite, dolomite, natural gas, quicksilver, salt, sandstone, glass sand.
------	------	[4]	------	151,888	------	33,118	Diatomite, jasper, natural gas, quicksilver, salt, sandstone, glass sand.
------	------	------	------	178,092	------	50,966	Diatomite, dolomite, gold, gypsum, natural gas, petroleum, quicksilver, salt, sandstone, silver.
------	------	------	------	257,691	------	49,486	Diatomite, jasper, gold, gypsum, quicksilver, salt, sandstone, silver.
------	------	------	------	360,162	------	58,610	Diatomite, dolomite, quicksilver, salt, sandstone.
------	------	------	------	221,239	------	354,913	Diatomite, dolomite, gypsum, quicksilver, salt, sandstone.
------	------	[4]	------	587,681	------	555,119	Dolomite, quicksilver, salt, sandstone, silica (glass sand).
[4]398,800	$65,810	[4]92,618	$98,261	$5,341,086	------	$3,721,826	

MINERAL PRODUCTION OF

Year	Quicksilver		Mineral water	
	Flasks	Value	Gallons	Value
Manhattan Mine output, 1863 to 1876	3,594	$235,876		
1862	444	16,139		
1863	852	35,852		
1864	2,714	124,573		
1865	3,545	162,716		
1866	2,254	119,755		
1867	7,862	360,866		
1868	9,808	450,187		
1869	6,598	302,848		
1870	5,766	330,853		
1871	4,098	258,584		
1872	4,876	321,475		
1873	5,266	423,018		
1874	11,705	1,231,132		
1875	9,453	795,470		
1876	11,303	497,332		
1877	13,127	489,637		
1878	10,810	355,649		
1879	9,446	281,961		
1880	6,830	211,730		
1881	7,746	231,063		
1882	9,013	254,467		
1883	7,784	223,790		
1884	5,188	158,234		
1885	3,891	119,648		
1886	5,656	200,788		
1887	6,247	264,717		
1888	5,150	218,875		
1889	5,402	243,090		
1890	3,934	206,535		
1891	4,896	221,544		
1892	8,612	350,595		
1893	11,505	422,809		
1894	9,705	298,016	97,275	$41,231
1895	9,318	372,500	199,397	99,700
1896	11,411	403,031	218,680	81,335
1897	12,281	459,753	159,896	81,948
1898	12,368	472,972	169,261	63,919
1899	11,696	598,322	171,567	85,964
1900	8,724	403,500	171,000	72,200
1901	7,798	388,176	158,830	109,900
1902	7,142	304,474	236,229	97,048
1903	7,859	333,006	244,400	124,000
1904	[a]5,328	199,586	386,000	104,750
1905	4,853	171,910	279,400	89,500
1906	2,380	86,870	84,000	90,500
1907	2,500	95,400	240,000	103,600
1908	2,340	98,912	145,500	101,090
1909	1,625	80,535	123,072	96,279
1910	646	29,231	152,772	92,960
1911	140	6,441	141,540	86,530
1912	287	12,065	136,750	81,997
1913	287	11,546	151,520	75,548
1914	240	11,772	142,940	73,280
1915	507	45,224	133,387	73,535
1916	1,150	107,525	152,764	93,370
1917	834	78,320	126,124	70,058
1918	1,297	143,850	92,512	59,620
1919	644	58,140	76,860	60,395
1920	266	18,588	80,341	38,621
1921	35	1,659	72,364	55,760
1922	189	5,143	80,481	54,341
1923	157	9,759	69,639	55,757
1924			73,608	53,391
1925			63,836	44,251
1926			80,376	49,468
1927	776	88,425	81,864	50,11[illegible]

NAPA COUNTY, 1862-1943

Magnesite		Miscellaneous stone,[1] value	Miscellaneous and unapportioned		
Tons	Value		Amount	Value	Substance
-----	-----	-----	-----	-----	
-----	-----	-----	-----	-----	
-----	-----	-----	-----	-----	
-----	-----	-----	-----	-----	
-----	-----	-----	-----	-----	
-----	-----	-----	-----	-----	
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-----	-----	-----	-----	-----	
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-----	-----	-----	-----	-----	
-----	-----	-----	-----	-----	
-----	-----	-----	-----	-----	
-----	-----	-----	-----	-----	
-----	-----	-----	-----	$93,000	Gold and silver
-----	-----	-----	-----	-----	
-----	-----	-----	-----	-----	
-----	-----	-----	-----	-----	
-----	-----	-----	-----	-----	
-----	-----	-----	-----	-----	
-----	-----	-----	-----	-----	
-----	-----	-----	-----	-----	
-----	-----	-----	-----	-----	
-----	-----	-----	-----	-----	
-----	-----	-----	-----	-----	
-----	-----	-----	-----	5,000	Gold and silver.
-----	-----	-----	-----	16,000	Gold and silver.
-----	-----	-----	-----	22,500	Gold and silver.
-----	-----	-----	-----	50,000	Gold and silver.
-----	-----	-----	-----	95,000	Gold and silver.
-----	-----	-----	-----	57,046	Gold and silver.
1,500	$6,000	-----	-----	30,517	Gold and silver.
-----	-----	-----	-----	23,689	Gold and silver.
-----	-----	-----	-----	-----	
1,440	10,240	-----	51 tons	2,040	Infusorial earth.
2,200	17,000	-----	-----	-----	
1,500	11,000	-----	-----	-----	
1,143	13,671	-----	-----	-----	
1,263	19,075	-----	-----	-----	
1,180	17,130	-----	-----	-----	
1,983	17,400	-----	-----	-----	
700	11,622	-----	8,919 tons	6,690	Limestone.
150	450	$500	7,086 tons	8,496	Limestone.
61	915	3,375	290,368 bbls.	435,552	Cement.
12	78	4,019	-----	-----	
-----	-----	500	-----	-----	
-----	-----	2,777	-----	-----	
-----	-----	3,000	-----	-----	
-----	-----	78,728	-----	-----	
-----	-----	138,636	-----	3,151,182	Unapportioned, 1900 to 1909.
-----	-----	122,219	-----	2,893,786	Unapportioned, 1910 to 1913.
-----	-----	127,428	-----	-----	
55	550	172,646	-----	-----	
-----	-----	243,759	-----	8,000	Sandstone.
-----	-----	130,316	-----	756,380	Other minerals.
1,050	9,450	108,387	-----	647,625	Cement, sandstone.
			715 tons	11,559	Chromite.
13,960	108,556	88,441	119,500 cu. ft.	5,500	Building stone (tuff).
			-----	663,586	Other minerals.
40,329	387,930	110,039	844 tons	22,020	Chromite.
			-----	752,706	Cement, clay, copper.
29,163	263,367	82,944	667 tons	38,432	Chromite.
			-----	1,088,154	Cement, gold, silver.
10,112	86,752	70,016	-----	-----	
[4]	-----	74,550	-----	98,382	Magnesite, volcanic ash.
-----	-----	111,100	-----	26,720	Other minerals.
[4]	-----	200,151	-----	52,635	Building stone (red tuff), magnesite.
-----	-----	215,356	-----	70,720	Other minerals.
[4]	-----	261,523	-----	44,351	Magnesite, quicksilver.
			-----	195	Gold.
-----	-----	177,186	-----	1,420	Silver.
			-----	6,120	Other minerals.
			-----	7,817	Gold.
-----	-----	207,882	-----	50,616	Silver.
			-----	25,788	Other minerals.
			-----	7,235	Gold.
-----	-----	209,996	-----	56,435	Silver.
			-----	5,022	Copper, sandstone.

MINERAL PRODUCTION OF

Year	Quicksilver		Mineral water	
	Flasks	Value	Gallons	Value
1928	781	$85,477	70,291	$32,707
1929	2,081	246,747	86,141	90,703
1930	2,000	213,840	43,902	13,837
1931	1,937	168,710	106,062	49,665
1932	647	34,634	33,011	12,293
1933	842	47,059	15,237	9,940
1934	1,706	120,372	47,900	13,900
1935	1,109	60,649	38,000	3,650
1936	737	55,556	55,590	7,245
1937	329	26,051	77,531	15,683
1938	694	46,403	53,152	9,658
1939	691	71,823	94,750	12,650
1940	1,479	245,757	127,681	16,250
1941	1,999	337,726	69,026	19,51
1942	1,905	356,532	41,312	4,890
1943	2,023	363,017	33,506	3,569
Totals	361,118	$17,995,810	5,987,367	$2,928,301

Grand total value, $42,774,753.

[1] Includes crushed rock, macadam, rubble, paving blocks, sand, gravel.
[2] Napa Soda Springs have been bottling water for sale since 1860; but no segregated figures available for Napa County previous to 1894.
[3] Flasks of 76½ pounds to June, 1904; of 75 pounds thence, through 1927; of 76 pounds since January, 1928.
[4] See under 'Unapportioned.'

NAPA COUNTY, 1862-1943—Continued

Magnesite		Miscellaneous stone,[1] value	Miscellaneous and unapportioned		
Tons	Value		Amount	Value	Substance
		$179,078		$9,000	Other minerals.
		216,420	4,356 lbs.	767	Copper.
				17,781	Gold.
			144,180 fine oz.	76,848	Silver.
				556	Other minerals.
			9,275 lbs.	1,203	Copper.
				36,532	Gold.
			464 lbs.	23	Lead.
			266,386 fine oz.	102,559	Silver.
				164,989	Miscellaneous stone and sandstone.
		145,920	1,945 lbs.	177	Copper.
				14,766	Gold.
			60,009 fine oz.	17,403	Silver.
				200	Other minerals.
		115,982		6,724	Asbestos, pumice, sandstone.
		142,143		10,400	Pumice and sandstone.
		256,982		6,960	Asbestos, pumice, paving blocks, sandstone.
		[4]		3,894	Gold.
				8,470	Silver.
				121,403	Chromite, copper, pumice, miscellaneous stone.
		[4]		504,352	Chromite, copper, lead, gold, pumice, sandstone, silver, miscellaneous stone.
		246,665	1,156 lbs.	140	Copper.
				12,355	Gold.
				51,641	Silver.
				3,611	Other minerals.
		[4]	4,450 lbs.	436	Copper.
				64,260	Gold.
				95,895	Silver.
				421,311	Pumice, sandstone, miscellaneous stone.
		[4]	9,667 lbs.	1,005	Copper.
				115,710	Gold.
				197,696	Silver.
				316,011	Onyx, pumice, sandstone, miscellaneous stone.
		[4]		567,582	Onyx, copper, gold, silver, pumice, sandstone, miscellaneous stone.
		[4]	2,406 lbs.	284	Copper.
				12,250	Gold.
				25,686	Silver.
				623,719	Asbestos, chromite, pumice, sandstone, miscellaneous stone.
		[4]		1,086,216	Asbestos, pumice, sandstone, miscellaneous stone.
		[4]		581,971	Asbestos, pumice, miscellaneous stone.
[4]107,801	$981,186	[4]$4,248,664		$16,620,792	

MINERAL PRODUCTION OF

Year	Copper		Gold, value	Granite	
	Pounds	Value		Cubic feet	Value
1880			$2,702,362		
1881			3,700,000		
1882			3,500,000		
1883			3,000,000		
1884			2,950,000		
1885			2,577,873		
1886			3,221,038		
1887			2,719,574		
1888			2,600,000		
1889			2,249,335		
1890			1,969,613		
1891			2,207,886		
1892			1,945,406		
1893			2,067,203		
1894	83,728	$7,535	1,830,155		
1895	33,255	3,325	1,789,816		
1896	28,200	2,820	2,380,756		
1897			1,885,251	1,100	$2,200
1898	30,000	3,000	2,017,628	2,000	1,500
1899	43,438	7,084	2,171,510	2,000	1,500
1900	150,980	20,472	1,812,036		
1901	39,588	6,235	2,121,054		
1902	26,500	3,975	2,142,740	1,000	3,000
1903	4,500	585	2,458,047	2,170	4,160
1904			3,130,304	2,335	5,395
1905			3,179,715	2,155	2,570
1906			2,658,420	9,525	9,300
1907	22,082	4,418	2,162,083	12,840	9,300
1908	30,166	4,104	2,297,963	700	2,100
1909			2,660,235	1,250	2,800
1910			2,533,483	2,225	3,215
1911	1,665	209	2,199,147	1,250	3,500
1912			2,081,958		
1913			2,918,733		
1914	39	5	3,301,948		
1915	1,817	318	3,466,722		
1916	3,487	858	3,669,878	100	100
1917	40,165	10,965	3,682,947		
1918	42,203	10,424	3,070,453		
1919	[2]		2,981,312	[2]	
1920	[2]		2,872,471	[2]	
1921			2,570,162	[2]	
1922	[2]		2,903,573	[2]	
1923	[2]		2,282,155	[2]	
1924	[2]		2,820,032	[2]	
1925	[2]		2,305,607	[2]	
1926	[2]		2,318,846	[2]	
1927	[2]		2,127,195	[2]	
1928	[2]		1,994,002	[2]	
1929	5,702	1,004	1,807,613	[2]	
1930	17,009	2,211	2,193,486		
1931	143,984	13,103	3,304,815		
1932	33,454	2,108	3,640,797		
1933	67,179	4,299	4,676,357		
1934	113,771	9,101	7,118,551	[2]	
1935	201,890	16,757	8,785,099		
1936	149,673	13,770	9,897,265	[2]	
1937	178,643	21,616	10,805,200	[2]	
1938	124,058	12,158	11,261,530	[2]	
1939	27,113	2,820	11,155,655	[2]	
1940	39,403	4,453	10,964,415	[2]	
1941	24,617	2,905	9,872,275		
1942	13,299	1,609	5,655,755		
1943	4,549	591	751,905		
Totals	1,726,157	$194,837	$228,099,345	[2]40,650	$50,64

Grand total value, $236,146,097.

1 Includes crushed rock, rubble, sand, gravel.
2 See under 'Unapportioned.'

NEVADA COUNTY, 1880-1943

Lead		Silver, value	Miscellaneous stone[1], value	Miscellaneous and unapportioned		
Pounds	Value			Amount (tons)	Value	Substance
-----	-----	$70,144	-----	-----	-----	
-----	-----	9,500	-----	-----	-----	
-----	-----	10,000	-----	-----	-----	
-----	-----	8,000	-----	-----	-----	
-----	-----	5,000	-----	-----	-----	
-----	-----	4,835	-----	-----	-----	
-----	-----	8,333	-----	-----	-----	
-----	-----	2,477	-----	-----	-----	
-----	-----	5,000	-----	-----	-----	
-----	-----	5,633	-----	-----	-----	
-----	-----	14,713	-----	-----	-----	
-----	-----	14,184	-----	-----	-----	
-----	-----	8,326	-----	-----	-----	
-----	-----	1,229	-----	-----	-----	
-----	-----	476	-----	290	$5,800	Mineral paint.
-----	-----	400	-----	150	2,250	Mineral paint.
-----	-----	8,584	-----	-----	-----	
-----	-----	8,116	-----	-----	-----	
-----	-----	19,476	-----	50	1,000	Mineral paint.
				6,000	30,000	Pyrite.
-----	-----	17,784	-----	300	5,400	Mineral paint.
				5,400	28,620	Pyrite.
-----	-----	66,841	-----	2,925	17,550	Pyrite.
-----	-----	18,122	-----	78	429	Pyrite.
-----	-----	6,124	-----	-----	-----	
-----	-----	3,252	-----	-----	-----	
-----	-----	9,555	-----	-----	-----	
-----	-----	32,523	-----	-----	20	Platinum.
-----	-----	24,219	-----	-----	-----	
-----	-----	17,505	-----	-----	-----	
663	$25	21,914	$1,678	-----	-----	
-----	-----	24,926	1,874	-----	400,000	Unapportioned, 1900-1909.
-----	-----	16,506	-----	-----	-----	
14,831	667	15,691	-----	-----	-----	
1,785	80	22,830	-----	-----	-----	
2,090	92	26,542	5,000	-----	-----	
145	6	27,000	2,108	-----	60	Gems.
1,567	74	23,762	3,675	-----	1,950	Other minerals.
1,036	71	35,741	1,225	981	12,795	Chromite.
				-----	23,475	Manganese, platinum, tungsten.
(2)	-----	52,335	1,600	1,962	43,449	Chromite.
				-----	47,101	Asbestos, lead, platinum, tungsten concentrates.
(2)	-----	72,557	1,400	3,328	116,993	Chromite.
				-----	29,884	Asbestos, lead, manganese, platinum, tungsten concentrates.
(2)	-----	68,731	1,976	-----	12,034	Asbestos, barytes, chromite, copper, granite, lead, platinum.
(2)	-----	58,476	6,528	-----	17,531	Asbestos, barytes, copper, granite, lead.
-----	-----	33,906	19,151	-----	17,862	Asbestos, barytes, granite.
(2)	-----	19,583	27,982	-----	14,867	Barytes, copper, granite, lead, mineral paint.
1,290	90	30,534	42,309	-----	15,682	Asbestos, barytes, copper, granite, mineral paint, platinum.
(2)	-----	39,252	82,200	-----	3,783	Copper, granite, lead.
(2)	-----	32,155	10,333	-----	4,782	Chromite, copper, granite, lead.
4,301	344	30,015	850,000	-----	41,006	Barytes, copper, granite.
(2)	-----	27,581	15,000	-----	43,933	Barytes, copper, granite, lead.
(2)	-----	20,798	4,000	-----	5,086	Copper, granite, lead.
6,603	416	21,861	83,770	-----	65,364	Baryte and granite.
18,164	908	23,316	76,850	-----	23,462	Baryte and platinum.
198,671	7,351	43,611	123,024	149,865 lbs.	5,314	Zinc.
82,119	2,464	29,868	24,866	-----	4,000	Other minerals.
72,380	2,678	56,109	24,400	34,478 lbs.	1,448	Zinc.
				-----	2,100	Other minerals.
130,013	4,281	203,190	151,032	-----	2,300	Other minerals.
355,526	14,221	374,010	2,661	-----	2,400	
307,272	14,134	352,665	41,205	-----	3,656	Include granite, platinum.
316,006	18,644	391,502	144,300	-----	3,794	Include granite, platinum, mineral paint.
286,006	13,174	326,565	44,758	-----	9,711	Include granite, platinum, barite.
39,921	1,876	278,864	21,446	-----	7,895	Include granite, platinum, barite.
8,593	430	305,046	40,718	-----	36,100	Barite, and granite.
10,234	583	316,256	6,157	-----	57,000	Other minerals.
14,562	976	214,018	7,499	-----	76,381	Barite, manganese ore.
18,346	1,376	73,565	14,203	-----	49,007	Barite, chromite, manganese ore, tungsten.
1,892,862	$85,501	$4,111,632	$1,884,928	-----	$1,719,214	

MINERAL PRODUCTION OF

Year	Petroleum		Natural gas, value	Brick	
	Barrels	Value		M	Value
1889					
1890					
1892					
1894					
1895					
1897	12,000	$12,000			
1898	60,000	60,000		300	$2,40
1899	108,077	108,077		200	1,60
1900	254,397	254,397			
1901	302,652	181,591			
1902	1,103,793	824,492			
1903	1,355,104	1,016,285		1,634	13,00
1904	1,470,000	1,144,542		1,500	9,00
1905	1,510,900	711,633		118	11,80
1906	2,388,000	1,194,000		1,365	13,50
1907	2,426,750	1,456,050		3,176	26,00
1908	3,376,689	2,532,517		4,050	20,45
1909	4,270,967	2,690,709		4,090	20,65
1910	5,044,001	3,177,721		2,950	31,00
1911	6,345,275	4,097,980		1,650	11,55
1912	6,704,421	4,478,553	$5,250	1,300	9,10
1913	9,485,362	6,867,402	9,612	2,100	14,00
1914	12,758,678	8,612,108	112,040	1,333	19,30
1915	12,715,457	6,510,314	81,753	1,280	16,00
1916	13,198,591	8,750,666	139,281	1,186	8,30
1917	14,680,801	14,724,843	490,511	and tile	11,00
1918	15,730,462	22,211,412	693,169	477	3,86
1919	14,458,722	26,893,223	837,439	[2]	
1920	15,462,741	33,059,340	862,446	[2]	
1921	22,929,466	45,996,509	1,312,704	2,994	47,72
1922	31,049,491	36,483,162	2,096,629	4,706	73,10
1923	46,474,921	40,897,930	3,914,661	8,499	103,42
1924	31,661,283	37,455,298	2,397,813	[2]	
1925	32,734,420	46,384,673	2,324,014	3,253	39,44
1926	37,989,349	59,225,395	3,556,194	6,272	72,48
1927	46,593,842	56,238,767	3,910,501	1,283	13,14
1928	37,100,943	34,607,932	4,695,769	[2]	
1929	25,861,815	25,504,922	2,602,382	774	7,74
1930	23,113,820	24,500,649	1,394,600	[2]	
1931	17,524,067	13,231,012	1,494,855	[2]	
1932	16,981,368	12,939,802	1,095,752	[2]	
1933	22,046,475	18,239,049	912,317	[2]	
1934	25,891,732	24,258,123	1,366,560	[2]	

ORANGE COUNTY, 1889-1943

Clay		Stone industry,[1] value	Miscellaneous minerals		
Tons	Value		Amount	Value	Kind
-----	-----	-----	-----	$6,262	Gold.
-----	-----	-----	-----	10,943	Gold.
-----	-----	-----	-----	9,470	Gold.
-----	-----	-----	1,500 tons	6,000	Coal.
-----	-----	-----	900 tons	4,000	Coal.
			-----	144	Gold.
-----	-----	-----	-----	-----	
-----	-----	-----	800 tons	3,200	Coal.
-----	-----	-----	600 tons	2,400	Coal.
-----	-----	-----	25 tons	250	Gypsum.
			240 cu. ft.	120	Sandstone.
			-----	2,407	Gold.
-----	-----	-----	500 tons	2,250	Coal.
			300 tons	1,500	Coal.
			-----	4,000	Gold.
-----	-----	-----	-----	250	Gold.
-----	-----	-----	-----	150	Gold.
-----	-----	-----	408 cu. ft.	200	Sandstone.
10,500	$14,581	-----	500 cu. ft.	250	Sandstone.
7,740	12,900	-----	-----	-----	
-----	-----	-----	964 lbs.	193	Copper.
			24,472 lbs.	1,303	Lead.
			33,546 lbs.	2,000	Zinc.
9,000	18,600	$3,005	14,405 lbs.	534	Lead.
2,617	26,170	23,665	-----	72,586	Unapportioned 1900-1909.
500	5,000	6,443	-----	-----	
2,000	3,200	855	-----	-----	
2,100	3,400	21,248	459 tons	688	Glass sand.
15,500	20,666	36,815	-----	-----	
-----	-----	88,315	-----	-----	
-----	-----	9,027	364 lbs.	17	Lead.
			4 lbs.	1	Copper.
-----	-----	3,773	-----	3,066	Other minerals.
[2]	-----	2,699	-----	2,573	Pottery clay, copper, lead.
3,649	4,650	1,560	-----	-----	
[2]	-----	1,944	-----	18,499	Clay and clay products.
			-----	97,632	Lead and potash.
			455 lbs.	84	Copper.
[2]	-----	80,988	-----	145	Gold.
			15,932 lbs.	1,275	Lead.
			-----	7,263	Silver.
			-----	96,595	Brick, clay, potash.
-----	-----	131,301	-----	10,796	Pottery clay, copper, gold, lead and silver.
-----	-----	270,022	-----	3,168	Clay (pottery), gold, lead and silver.
-----	-----	536,767	-----	16,203	Clay (pottery), copper, gold, lead and silver.
			-----	121,260	Brick and clay.
[2]	-----	505,932	-----	907	Copper, lead, silver.
			-----	52	Gold.
13,431	42,562	307,112	-----	995	Silver.
			-----	5,637	Copper, lead, zinc.
13,150	38,989	317,767	-----	60	Gold.
			-----	414	Lead.
			-----	967	Silver.
14,637	49,354	325,676	-----	10,807	Copper, potash, zinc.
			-----	9,600	Barite, quicksilver.
98,392	87,245	244,634	-----	19,597	Brick and quicksilver.
30,147	111,349	263,250	-----	29	Gold.
			1,471 lbs.	93	Lead.
			839 fine oz.	447	Silver.
			-----	1,280	Copper and quicksilver.
18,224	78,366	252,501	-----	109,174	Brick and mineral water.
21,900	28,430	275,367	-----	105,494	Brick and mineral water.
9,892	33,217	87,592	-----	25,882	Brick, mineral water, quicksilver.
13,486	49,762	46,340	-----	105	Gold.
			2 fine oz.	1	Silver.
			-----	16,007	Brick, mineral water, glass sand, quicksilver.
12,740	31,328	78,986	-----	572	Gold.
			2 fine oz.	1	Silver.
			-----	10,461	Brick and mineral water.

MINERAL PRODUCTION OF

Year	Petroleum		Natural gas, value	Brick	
	Barrels	Value		M	Value
1935	24,971,601	$22,422,526	$1,802,397	[2]	-----------
1936	21,685,351	20,321,674	1,466,555	[2]	-----------
1937	22,060,820	20,854,524	1,599,811	[2]	-----------
1938	20,667,775	19,768,434	1,510,990	[2]	-----------
1939	18,314,989	17,434,038	1,185,021	[2]	-----------
1940	17,998,175	16,190,394	1,071,924	[2]	-----------
1941	19,962,737	17,987,662	992,110	[2]	-----------
1942	24,122,716	25,459,382	1,293,338	[2]	-----------
1943	26,441,558	26,325,466	1,079,728	[2]	-----------
Totals	759,402,554	$814,297,178	$48,299,126	[2]56,490	$599,593

Grand total value, $871,998,307.

[1] Includes crushed rock, rubble, rip-rap, sand, gravel.
[2] See under 'Unapportioned.'

ORANGE COUNTY, 1889-1943—Continued

Clay		Stone industry,[1] value	Miscellaneous minerals		
Tons	Value		Amount	Value	Kind
			-------------	$1,154	Gold.
			-------------	1,599	Lead.
19,276	$60,021	$45,311	39,981 lbs.	2,344	Zinc.
			-------------	11,113	Silver.
			-------------	14,169	Brick, copper, mineral water, glass sand.
20,519	62,364	256,744	-------------	25,582	Brick, copper, lead, zinc, gold, silver, mineral water, salt.
29,415	84,513	112,025	-------------	8,507	Brick, and salt.
			-------------	245	Gold.
22,522	89,954	201,444	-------------	411	Silver.
			-------------	29,574	Brick, copper, lead, quicksilver, salt, glass sand.
25,599	108,738	95,038	-------------	27,947	Brick, gold, lead, quicksilver, salt, glass sand, silver, zinc.
			1,235 lbs.	140	Copper.
			-------------	1,505	Gold.
45,555	151,005	122,331	38,571 lbs.	1,928	Lead.
			-------------	10,789	Silver.
			51,267 lbs.	3,230	Zinc.
			-------------	21,901	Brick, mineral water, quicksilver, salt, glass sand.
			-------------	630	Gold.
			10,196 lbs.	581	Lead.
32,007	142,603	238,021	-------------	3,446	Silver.
			31,979 lbs.	2,398	Zinc.
			-------------	32,024	Brick, copper, mineral water, salt, glass sand.
			-------------	175	Gold.
			9,286 lbs.	622	Lead.
57,885	177,954	543,143	-------------	2,363	Silver.
			7,450 lbs.	693	Zinc.
			-------------	30,827	Brick, copper, mineral water, salt, silica.
38,039	160,389	458,665	-------------	295	Silver.
			-------------	44,353	Brick, copper, lead, mineral water, silica (glass sand).
[2]590,422	$1,715,799	$5,996,306	-------------	$1,090,305	

MINERAL PRODUCTION OF

Year	Gold, value	Silver, value	Copper		Brick		Pottery clay†	
			Pounds	Value	M	Value	Tons	Value
1880	$838,133	$640	-----	-----	-----	-----	-----	-----
1881	850,000	6,500	-----	-----	-----	-----	-----	-----
1882	800,000	-----	-----	-----	-----	-----	-----	-----
1883	810,000	-----	-----	-----	-----	-----	-----	-----
1884	887,320	5	-----	-----	-----	-----	-----	-----
1885	906,301	-----	-----	-----	-----	-----	-----	-----
1886	1,071,663	1,397	-----	-----	-----	-----	-----	-----
1887	855,510	556	-----	-----	-----	-----	-----	-----
1888	850,000	1,000	-----	-----	-----	-----	-----	-----
1889	1,245,491	1,975	-----	-----	-----	-----	-----	-----
1890	1,003,602	1,045	-----	-----	-----	-----	-----	-----
1891	998,495	5,921	-----	-----	-----	-----	-----	-----
1892	1,159,080	2,120	-----	-----	-----	-----	-----	-----
1893	1,351,250	616	-----	-----	-----	-----	-----	-----
1894	1,851,215	664	-----	-----	-----	-----	22,000	$27,500
1895	1,599,635	5,273	-----	-----	-----	-----	15,000	15,000
1896	1,674,844	6,690	-----	-----	-----	-----	10,000	10,000
1897	1,524,941	6,784	-----	-----	-----	-----	7,500	7,500
1898	1,488,022	5,670	-----	-----	-----	-----	12,000	12,000
1899	1,100,081	1,206	-----	-----	-----	-----	15,000	15,000
1900	986,155	12,058	-----	-----	-----	-----	15,000	15,000
1901	900,745	4,828	11,200	$1,764	-----	-----	15,000	15,000
1902	843,366	3,341	3,200	368	-----	-----	15,000	15,000
1903	570,571	1,116	4,000	520	-----	-----	15,000	15,000
1904	778,355	9,320	600,000	76,500	-----	-----	16,100	16,100
1905	597,793	8,041	367,250	57,291	-----	-----	20,000	10,000
1906	*	*	200,000	38,600	-----	-----	20,000	15,000
1907	482,772	3,338	-----	-----	-----	-----	20,000	20,000
1908	358,096	2,194	-----	-----	13,000	$46,300	13,000	11,500
1909	281,372	1,492	-----	-----	2,083	52,300	45,300	35,250
1910	257,191	1,157	-----	-----	600	23,438	44,000	27,000
1911	251,298	2,585	118,624	14,828	700	18,000	43,120	29,200
1912	367,383	4,791	78,170	12,898	900	21,250	56,000	41,300
1913	220,785	2,972	429	67	1,900	40,000	63,600	47,200
1914	600,000	4,500	453	60	2,000	40,000	63,700	49,000
1915	414,319	24,543	*	-----	2,000	40,000	49,126	37,536
1916	428,400	24,928	1,437,441	353,610	2,540	79,000	29,018	36,230
1917	538,686	13,885	710,601	193,994	*	-----	44,097	44,097
1918	230,190	22,432	837,527	206,879	and tile	81,408	29,348	29,348
1919	170,609	3,141	-----	-----	*	-----	*	-----
1920	151,088	2,178	-----	-----	and tile	149,924	65,560	76,50

PLACER COUNTY, 1880-1943

Lime and limestone		Miscellaneous stone,[1] value	Miscellaneous and unapportioned		
Amount	Value		Amount	Value	Substance
------------	------------	------------	------------	------------	
------------	------------	------------	------------	------------	
------------	------------	------------	------------	------------	
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------------	------------	------------	------------	------------	
------------	------------	------------	------------	------------	
------------	------------	------------	------------	------------	
------------	------------	$67,200	------------	------------	
------------	------------	56,620	25 tons	$1,000	Asbestos.
------------	------------	44,216	------------	------------	
------------	------------	39,412	------------	------------	
------------	------------	29,833	------------	------------	
------------	------------	61,525	------------	------------	
------------	------------	115,669	------------	------------	
------------	------------	102,847	------------	------------	
------------	------------	156,402	------------	------------	
[2]1,500 [3]4,000	$9,000 4,000	198,530	------------ ------------	280 1,968	Platinum. Quartz.
------------	------------	123,448	------------	375	Platinum.
[2]15,533	8,737	116,746	2 ozs.	36	Platinum.
[2]11,699	11,950	71,130	0.66 ozs. 50 tons	12 2,500	Platinum. Asbestos.
[2]11,430 [3]38,869	11,430 79,768	118,722	70 tons	3,500	Asbestos.
[2]1,727	1,710	178,460	50 tons	5,000	Asbestos.
[2]24,322	25,864	203,783	------------ 60 tons	$62,362 6,000	Unapportioned, 1901-1902. Asbestos.
[2]10,000	12,100	242,773	200 tons	20,000	Asbestos.
------------	------------	218,951	125 tons 300 tons 90 tons	500 3,300 584	Asbestos. Magnesite. Mineral paint.
[3]222,595	200,000	231,415	50 tons 1,000 tons	500 2,000	Magnesite. Glass sand.
------------	------------	205,749	805 lbs. 2,000 tons	35 4,000	Lead. Quartz.
[3]202,575	202,575	203,593	835 lbs.	15	Lead.
[4]1,236	2,432	98,187	711 lbs. ------------	33 346,810	Lead. Asbestos and copper.
------------	------------	17,026	744 tons ------------ ------------	11,956 80,931 10,548	Chromite. Granite. Lead, limestone, magnesite.
------------	------------	10,727	4,287 tons ------------ ------------	105,384 30,392 92,624	Chromite. Granite. Asbestos, brick, platinum, tile, gems, magnesite.
------------	------------	4,266	4,963 tons ------------ ------------	276,765 30,882 21,360	Chromite. Granite. Magnesite and silica.
------------	------------	4,330	1,018 tons ------------ ------------ ------------	24,000 98,513 36,233 1,055	Chromite. Clay and clay products. Granite. Other minerals.
------------	------------	6,688	300 tons ------------ ------------	7,985 212,625 5,825	Chromite. Granite. Other minerals.

MINERAL PRODUCTION OF

Year	Gold, value	Silver, value	Copper		Brick		Pottery clay†	
			Pounds	Value	M	Value	Tons	Value
1921	$132,468	$1,068			and tile	$144,508	76,665	$95,930
1922	119,673	952			and tile	118,797	79,531	111,166
1923	75,732	297					82,919	143,097
1924	108,757	534			and tile	186,053	97,670	146,508
1925	121,785	620			and tile	147,981	102,598	138,813
1926	82,921	346			and tile	150,591	104,250	147,241
1927	97,494	440					61,388	106,710
1928	71,959	338	[4]		[4]		110,353	163,644
1929	34,691	133			[4]		118,704	158,531
1930	29,338	73	[4]		[4]		85,377	116,642
1931	72,409	271	[4]		[4]		78,501	122,515
1932	104,089	284	[4]		[4]		35,825	49,037
1933	167,774	475	[4]		[4]		40,658	59,261
1934	547,892	6,987	[4]		[4]		38,975	60,555
1935	925,309	13,614	3,178	$263	[4]		49,508	76,141
1936	1,366,400	16,067	3,080	283	[4]		72,817	103,457
1937	1,594,320	20,088	5,959	721	[4]		70,960	107,13
1938	1,805,965	27,944	7,704	755	[4]		60,708	85,33
1939	1,533,945	36,814	5,719	595	[4]		65,322	91,081
1940	1,813,210	42,687	10,578	1,195			57,323	81,70
1941	1,441,755	40,125	9,383	1,107	[4]		111,819	155,05
1942	815,185	22,408	7,600	920	[4]		137,565	175,92
1943	44,100	364	4,088	531	[4]		[4]	
Totals	$45,401,928	$433,711	[4]4,426,184	$963,739		$1,339,550	[4]2,502,905	$3,167,75

Grand total value, $59,908,684.

† Figures for value of clay are for crude clay only. The annual value of clay products is several times greater, but i omitted because there is only one factory. Production began in 1875.
[1] Includes granite (prior to 1916), crushed rock, rubble, rip-rap, paving blocks, sand, gravel.
[2] Barrels of lime.
[3] Tons of limestone.
[4] See under 'Unapportioned.'
[5] Includes chromite, mineral paint, mineral water.
[6] Includes brick, building tile, chromite.
[7] Includes mineral paint, mineral water, silica (quartz).
[8] Includes chromite, copper, silica (quartz).

PLACER COUNTY, 1880-1943—Continued

Lime and limestone		Miscel-laneous stone,[1] value	Miscellaneous and unapportioned		
Amount	Value		Amount	Value	Substance
------	------	$21,490	------	$48,328	Granite.
			------	5,278	Chromite, mineral paint, silica.
------	------	24,430	------	12,980	Granite.
			2,000 tons	5,500	Silica.
			------	12,477	Other minerals.[5]
------	------	139,829	------	5,146	Granite.
			3,656 tons	10,040	Silica (quartz).
			------	120,372	Other minerals.[6]
------	------	15,573	------	19,155	Granite.
			------	15,600	Other minerals [7]
------	------	117,990	------	14,929	Granite.
			------	8,295	Other minerals.[8]
------	------	81,814	6,092 cu. ft.	11,969	Granite.
			------	6,000	Other minerals.
------	------	40,357	8,590 cu. ft.	18,109	Granite.
			2,700 tons	8,100	Silica.
			------	89,014	Other minerals.
------	------	23,096	12,370 cu. ft.	19,655	Granite.
			------	54,443	Brick and hollow building tile, copper, mineral paint, mineral water.
------	------	9,469	------	20,385	Granite.
			------	43,136	Brick and hollow building tile, mineral paint, silica.
------	------	133,339	9,246 cu. ft.	15,841	Granite.
			------	28,484	Brick and hollow building tile, chromite, copper, mineral paint, silica.
------	------	55,666	------	6,300	Granite.
			------	28,687	Brick and hollow building tile, chromite, copper, mineral paint, mineral water, silica.
------	------	40,405	6,450 cu. ft.	22,625	Granite.
			------	23,808	Brick and hollow building tile, copper, mineral water.
------	------	41,761	------	24,595	Brick, chromite, copper, granite, lead, mineral water.
------	------	33,413	------	29,385	Brick, copper, granite, lead, mineral water, chromite.
------	------	3,631	------	7,493	Brick, chromite, granite, lead, mineral paint, quartz.
------	------	44,459	5,178 lbs.	238	Lead.
			------	23,961	Brick, granite, mineral paint, mineral water, platinum, quartz.
------	------	[4]	10,432 lbs.	615	Lead.
			------	31,158	Brick, chromite, granite, mineral paint, platinum, miscellaneous stone, zircon.
------	------	54,148	15,300 lbs.	704	Lead.
			------	45,189	Brick, chromite, granite, mineral water, platinum.
------	------	20,880	26,490 lbs.	1,241	Lead.
			------	26,182	Brick, granite, mineral water, platinum.
		48,054	43,371 lbs.	2,169	Lead.
			------	34,460	Brick, granite, mineral water, platinum, quartz, zircon.
------	------	20,873	43,573 lbs.	2,484	Lead.
			------	98,191	Brick, chromite, granite, mineral water, platinum, zircon.
------	------	70,782	23,599 lbs.	1,579	Lead.
			------	248,246	Asbestos, brick, chromite, granite, mineral water.
------	------	27,548	------	204,740	Asbestos, brick, chromite, clay (pottery), granite, lead, manganese ore, mineral water.
------	[4]$569,566	[4]$3,997,264	------	$4,035,174	

MINERAL PRODUCTION OF

Year	Copper		Gold, value	Silver, value
	Pounds	Value		
1880			$857,124	$181
1881			1,350,000	2,000
1882			1,250,000	
1883			950,000	
1884			900,000	
1885			840,308	
1886			834,452	62
1887			698,069	16
1888			650,000	250
1889			796,754	235
1890			490,664	811
1891			482,462	
1892			432,295	11,731
1893			362,488	14
1894			499,359	
1895			602,951	271
1896			462,527	83
1897			339,252	701
1898			369,609	
1899			381,151	15
1900			365,210	4,159
1901			401,287	2,508
1902			360,686	517
1903	1,900	$247	424,112	510
1904			270,439	464
1905	1,006	157	283,810	530
1906			229,350	1,055
1907			219,355	948
1908			254,737	3,560
1909			157,491	587
1910			187,207	1,038
1911			228,785	1,125
1912	6,963	1,149	193,237	957
1913	[3]19,533	3,028	138,368	705
1914	[3]169,089	22,489	140,000	2,900
1915	3,164,496	553,787	167,440	19,025
1916	4,932,928	1,213,500	133,385	46,542
1917	7,462,870	2,037,364	131,955	74,461
1918	11,098,016	2,741,210	125,207	156,750
1919	10,193,951	1,896,075	83,600	175,846
1920	9,583,834	1,763,425	102,097	153,373
1921	11,584,216	1,494,364	127,148	171,090
1922	20,677,771	2,791,499	223,025	297,254
1923	22,883,609	3,363,891	174,871	243,970
1924	25,557,362	3,348,015	277,571	247,569
1925	26,950,029	3,826,904	249,540	294,254
1926	22,163,035	3,102,825	247,667	216,620
1927	21,055,425	3,758,261	321,016	179,108
1928	21,141,121	3,044,321	332,634	191,134
1929	25,253,603	4,444,634	391,683	271,712
1930	19,529,224	2,538,799	405,359	164,025
1931	12,473,960	1,135,130	308,443	93,472
1932	1,043,390	65,734	76,781	8,180
1933	[2]		70,000	402
1934	773	59	153,056	718
1935	1,654,113	137,291	207,856	34,402
1936	9,675,770	890,171	781,970	220,083
1937	9,879,959	1,195,475	911,610	227,296
1938	1,202,974	117,891	698,110	27,159
1939	8,051,386	837,344	1,266,335	132,077
1940	10,587,611	1,196,400	1,302,070	181,302
1941	7,510,414	886,229	1,268,960	128,437
1942	[2]		285,775	682
1943	13,252	1,723	7,490	428
Totals	[2]325,523,583	$48,409,391	$28,220,193	$3,995,304

Grand total, $81,898,958.

[1] Includes crushed rock, rubble, rip-rap, sand, gravel.
[2] See under 'Unapportioned.'
[3] Includes copper erroneously credited to Lassen County in those years, on account of shipping point being Doyle though the mines were located in Plumas County.

PLUMAS COUNTY, 1880-1943

Manganese		Miscellaneous stone,[1] value	Miscellaneous and unapportioned		
Tons	Value		Amount	Value	Substance
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------	------	------	------	------	
------	------	------	------	------	
1	$10	------	------	------	
2	40	------	------	------	
------	------	------	------	------	
1	25	------	------	------	
------	------	------	------	------	
------	------	------	------	------	
1	30	------	------	$25	Platinum.
1	25	$5,000	------	------	
1	25	------	------	------	
3	75	2,000	------	75,575	Unapportioned, 1900-1909.
5	75	12,500	1,115 lbs.	50	Lead.
2	40	------	1,329 lbs.	60	Lead.
2	40	1,350	5,856 lbs.	264	Lead.
------	------	1,700	5,621 lbs.	274	Lead.
------	------	1,879	2,058 lbs.	80	Lead.
------	------	5,431	------	32	Other minerals.
------	------	1,988	------	3,920	Chromite, granite, molybdenum.
1,540	39,680	1,322	473 tons ------	9,800 304	Chromite. Gems, granite, silica.
1,544	61,754	7,750	------	23	Other minerals.
[2]	------	850	------	1,825	Limestone, manganese.
------	------	62,109	------	2,658	Granite, lead, lime, platinum.
------	------	[2]	2,961 lbs. 18 fine oz. ------	133 1,615 4,111	Lead. Platinum. Granite and miscellaneous stone.
------	------	------	------	2,720	Granite, platinum, miscellaneous stone.
------	------	780	------	750	Other minerals.
------	------	------	------	2,950	Chromite, granite.
------	------	------	------	30,810	Chromite, granite, manganese ore, miscellaneous stone.
------	------	------	------	5,516	Granite, lead, manganese ore, platinum.
------	------	------	------	2,338	Granite, lead, lime.
------	------	28,124	------	2,914	Granite, lead, manganese.
------	------	80,420	------	3,520	Granite, lead, manganese.
------	------	106,900	491 lbs. ------	25 4,792	Lead. Granite and manganese.
------	------	20.250	------	2,001	Granite and lead.
------	------	20,000	------	10,617	Barytes, granite, platinum.
------	------	51,125	------	9,623	Barytes, copper, granite, lead.
------	------	[2] [2]	1,111 lbs. ------	110 27,200	Lead. Barite, granite, miscellaneous stone.
------	------	15,054	1,331 lbs. ------	53 19,860	Lead. Barite, and granite.
------	------	7,495	------	24,058	Barite, lead, granite, platinum.
------	------	20,317	------	259	Granite, and lead.
------	------	27,159	2,276 lbs. ------	105 150	Lead. Other minerals.
------	------	29,778	------	422	Other minerals.
------	------	59,427	88,162 lbs. ------	4,408 1	Lead. Other minerals.
------	------	71,203	72,104 lbs. ------	4,110 11,962	Lead. Chromite, manganese ore, platinum.
[2]	------	14,300	------	46,179	Chromite, copper, lead, manganese ore.
[2]	------	91,547	3,931 lbs. ------	295 106,026	Lead. Chromite, manganese ore.
[2]2,103	$101,819	[2]$747,758	------	$424,493	

MINERAL PRODUCTION OF

Year	Gold, value	Silver, value	Platinum		Brick	
			Ounces	Value	M	Value
1880	$342,514					
1881	425,000	$1,000				
1882	400,000					
1883	480,000					
1884	270,000					
1885	353,522					
1886	280,000					
1887	158,526	176				
1888	150,000					
1889	210,075					
1890	193,585					
1891	142,830	4				
1892	121,900					
1893	90,091					
1894	70,326				11,250	$56,250
1895	145,873				13,125	65,625
1896	133,050				8,700	44,200
1897	93,050				3,100	16,700
1898	57,301				11,000	44,000
1899	115,906				15,600	93,600
1900	176,007	[2]473			8,900	53,400
1901	229,034	[2]253			12,236	62,180
1902	425,894	330			10,492	78,198
1903	335,646	234			15,000	120,000
1904	419,287	75			4,500	20,000
1905	668,382	206	40	$700	18,000	130,000
1906	986,624	3,640	11	200	12,000	108,000
1907	790,973	2,034			16,078	128,624
1908	1,166,055	1,621			7,936	63,491
1909	1,669,814	2,856				
1910	1,396,874	4,606				
1911	1,812,826	3,047			13,017	76,571
1912	1,712,587	3,544			26,073	161,535
1913	2,503,633	3,406			22,535	144,191
1914	2,164,491	3,481	223	7,108	22,862	160,923
1915	2,131,813	3,151	196	6,217	9,920	82,973
1916	1,833,855	3,578	195	8,892	8,924	91,615
1917	1,919,581	4,487	157	12,453	and tile	122,88
1918	1,694,724	4,637	[3]			79,31
1919	1,714,193	5,276	[3]		[3]	
1920	1,575,033	4,534	[3]			248,43
1921	1,690,662	5,254	[3]			216,40
1922	1,350,749	3,392				259,26
1923	1,331,227	2,566	[3]			327,63
1924	1,150,687	1,753				290,21
1925	1,302,320	1,920				354,07
1926	1,304,046	1,627				388,69
1927	1,211,278	1,472				295,67
1928	1,558,173	1,779	[3]			295,66
1929	1,492,083	1,583	[3]			228,31
1930	1,724,712	1,313				195,80
1931	1,871,195	1,056	144	5,876		151,53
1932	2,100,250	1,120	[3]			85,18
1933	2,996,669	1,768	[3]			75,08
1934	3,555,468	2,940	[3]			40,57

SACRAMENTO COUNTY, 1880-1943

Granite		Natural gas		Miscellaneous stone,[1] value	Miscellaneous and unapportioned		
Cubic feet	Value	M cubic feet	Value		Amount	Value	Substance
--------	--------	--------	--------	--------	--------	--------	
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75,000	[4]$35,000	--------	--------	--------	--------	--------	
85,000	[4]45,000	--------	--------	--------	--------	--------	
--------	--------	--------	--------	$12,108	--------	--------	
207,845	62,339	--------	--------	28,074	--------	$1,500	Pottery clay.
4,840	4,000	15,000	$12,000	14,137	--------	--------	
1,524	1,145	12,000	10,000	13,105	--------	--------	
2,137	3,139	11,750	11,750	14,157	--------	--------	
2,635	2,882	--------	--------	7,926	--------	316	Copper.
288	136	38,550	31,200	19,380	--------	--------	
20,471	2,222	31,680	30,518	18,176	--------	--------	
5,164	4,458	39,200	39,200	22,103	--------	--------	
4,327	1,614	43,564	43,564	32,386	--------	--------	
10,905	1,779	60,225	52,874	18,141	--------	--------	
26,105	4,625	60,225	52,874	13,936	--------	--------	
44,151	44,151	55,000	55,000	151,477	--------	--------	
31,660	23,745	60,000	60,000	235,210	--------	314,438	Unapportioned, 1900-1909.
68,684	59,947	49,203	49,203	164,592	--------	--------	
45,630	2,307	9,000	83,890	131,037	--------	--------	
--------	--------	100,000	96,000	197,733	--------	--------	
--------	--------	72,000	36,000	238,476	--------	--------	
--------	--------	80,000	40,000	253,235	--------	--------	
--------	--------	108,000	54,000	284,127	--------	--------	
--------	--------	[3]	--------	194,718	227 lbs.	16	Lead.
					--------	46,000	Pottery, clay, natural gas.
--------	--------	[3]	--------	199,839	--------	27,000	Other minerals.
					310 tons	410	Pottery clay.
--------	--------	[3]	--------	262,689	--------	61,235	Natural gas, platinum, potash.
--------	--------	[3]	--------	276,732	--------	113,000	Clay and clay products.
					--------	61,395	Natural gas and platinum.
--------	--------	[3]	--------	180,563	--------	57,591	Natural gas and platinum.
--------	39,469	[3]	--------	386,911	--------	56,196	Natural gas and platinum.
--------	51,500	--------	--------	412,667	--------	111,991	Natural gas and platinum.
--------	30,740	[3]	--------	649,939	--------	93,907	Natural gas and platinum.
--------	11,150	[3]	--------	639,811	1,750 tons	4,470	Clay (pottery).
					--------	98,126	Natural gas, platinum.
--------	155,250	[3]	--------	590,359	--------	2,748	Clay (pottery).
					--------	97,730	Natural gas, platinum.
--------	7,812	[3]	--------	438,086	1,528 tons	2,310	Clay (pottery).
					--------	101,374	Natural gas, platinum.
--------	33,600	[3]	--------	754,206	--------	52,683	Clay (pottery), natural gas, platinum.
--------	19,658	[3]	--------	453,775	--------	60,591	Clay (pottery), natural gas, platinum.
--------	6,726	[3]	--------	463,930	--------	54,713	Clay (pottery), lead, natural gas, platinum.
--------	7,751	[3]	--------	346,195	--------	27,330	Clay (pottery), natural gas, platinum.
--------	12,316	[3]	--------	205,347	--------	12,345	Clay (pottery), lead, natural gas.
--------	--------	[3]	--------	135,544	--------	17,822	Clay (pottery), natural gas, platinum.
--------	--------	[3]	--------	82,602	--------	16,643	Copper, lead, natural gas, platinum.
--------	[3]	[3]	--------	233,294	--------	45,483	Copper, lead, granite, natural gas, platinum, paving blocks.

MINERAL PRODUCTION OF

Year	Gold, value	Silver, value	Platinum		Brick	
			Ounces	Value	M	Value
1935	$3,983,985	$3,163	[3]			77,562
1936	3,660,125	3,283	[3]			116,453
1937	3,660,765	3,359	[3]			[3]
1938	4,973,640	4,031	[3]			[3]
1939	5,374,935	5,104	[3]			[3]
1940	5,538,295	7,076	[3]			[3]
1941	6,287,575	7,276	[3]			[3]
1942	4,379,200	4,542	[3]		[3]	
1943	565,460	576	[3]		[3]	
Totals	$94,624,574	$124,602	[3]1,026	$41,446		$5,655,855

Grand total value, $127,630,402.

[1] Includes crushed rock, rubble, rip-rap, gravel, paving blocks.
[2] Recalculated to 'commercial' from 'coining value' as originally published.
[3] See under 'Unapportioned.'
[4] State Prison use, value estimated, as none reported.

SACRAMENTO COUNTY, 1880-1943—Continued

Granite		Natural gas		Miscellaneous stone,[1] value	Miscellaneous and unapportioned		
Cubic feet	Value	M cubic feet	Value		Amount	Value	Substance
----------	----------	[3]	----------	242,837	----------	$29,216	Natural gas, platinum.
----------	----------	[3]	----------	449,373	3,141 lbs.	147	Lead.
					----------	25,304	Copper, natural gas, platinum.
----------	----------	[3]	----------	513,699	----------	112,866	Brick and hollow tile, natural gas, platinum.
----------	----------	[3]	----------	376,159	----------	113,657	Brick, granite, natural gas, paving blocks.
----------	----------	[3]	----------	358,557	----------	117,001	Brick, clay, granite, natural gas, platinum, paving blocks.
----------	----------	[3]	----------	280,780	----------	102,683	Brick, clay, granite, natural gas, platinum.
----------	----------	4,005,707	355,397	703,243	----------	130,510	Brick, clay, copper, lead, granite, petroleum, platinum, paving blocks.
[3]	----------	49,172,104	3,937,671	1,425,785	----------	137,548	Brick and hollow tile, clay (pottery), granite, paving blocks, platinum.
[3]	----------	62,766,484	4,767,138	1,082,427	----------	173,397	Brick and hollow tile, clay (pottery), granite, platinum, paving blocks.
----------	$674,461	[3]116,870,692	$9,818,279	$14,209,493	----------	$2,481,692	

MINERAL PRODUCTION OF

Year	Quicksilver		Lime		Gypsum	
	Flasks	Value	Barrels	Value	Tons	Value
1865	[2]17,455	$943,617				
1866	6,525	346,673				
1867	11,493	527,529				
1868	12,180	559,062				
1869	10,315	473,459				
1870	9,888	567,373				
1871	8,180	516,158				
1872	8,171	538,714				
1873	7,735	621,353				
1874	6,911	726,899				
1875	8,432	709,553				
1876	7,272 [3]2,000	319,968 139,000				
1877	6,316	235,587				
1878	5,138	169,040				
1879	4,425	132,048				
1880	3,209	99,479				
1881	2,775	82,778				
1882	1,953	55,123				
1883	1,606	46,173				
1884	1,025	31,263				
1885	1,144	35,178				
1886	1,406	49,913				
1887	1,890	80,088				
1888	1,320	56,100				
1889	980	44,100				
1890	977	51,293				
1891	792	35,838				
1892	848	34,523				
1893	869	31,936				
1894	1,005	30,861	40,000	$44,000	762	$9,144
1895	1,100	36,000	41,000	41,000	750	8,250
1896	1,335	46,725	40,000	35,000	300	3,000
1897	3,605	135,185	25,000	18,500	300	2,000
1898	5,000	190,000			500	4,500
1899	4,780	245,000	16,600	18,675	100	700
1900	3,990	180,000	7,300	8,800		
1901	4,800	242,300				
1902	7,291	306,081				
1903	8,180	344,251				
1904	[5]8,480	314,000				
1905	7,764	279,651	15,000	15,000		
1906	7,203	262,909				
1907	7,675	292,878	8,453	8,453		
1908	9,600	405,792			2,000	8,000
1909	8,900	440,241			6,000	34,576
1910	10,800	488,700			12,000	50,000
1911	9,775	449,748			10,000	30,625
1912	9,743	409,596			8,000	32,000
1913	9,719	390,995			11,000	35,000
1914	6,633	325,349			7,000	21,000
1915	6,291	475,370				
1916	11,100	1,032,156				
1917	11,150	1,057,770				
1918	10,715	1,234,027				
1919	7,409	668,989				
1920	3,887	296,942				
1921	[6]					

SAN BENITO COUNTY, 1865-1943

Mineral water		Miscel-laneous stone,[1] value	Miscellaneous and unapportioned		
Gallons	Value		Amount	Value	Substance
			58 tons	$2,280	Antimony.
		$19,000			
5,000	$300	6,000	2 tons	70	Antimony.
500	100	2,638			
900	450	[4]17,500	45 tons	135	Coal.
1,000	500	[4]25,240	19 tons	380	Asphalt.
10,000	3,750	13,000	100 tons	100	Limestone.
500	125	[4]12,794			
600	150	22,000			
10,000	400	23,200			
		16,500	206 tons	2,472	Asphalt.
500	500	64,994			
2,600	3,120	23,000			
26,000	2,600	48,661			
26,000	2,600	63,220		16,500	Gems.
3,120	1,560	83,709		130,000	Unapportioned, 1900-1909.
3,500	1,400	94,243			
3,600	1,540	107,558			
26,000	1,240	83,232			
7,000	4,500	119,500			
700	280	110,630			
			260 M	1,560	Brick.
1,200	300	155,000	2,500 tons	9,500	Dolomite.
				335	Other minerals.
[6]		155,250	8,100 tons	25,515	Dolomite.
				526	Antimony and mineral water.
[6]		101,148		59,245	Antimony, chromite, magnesite, mineral water.
			7,000 tons	15,000	Dolomite.
			130 tons	7,000	Chromite.
[6]		103,295	5,000 tons	20,625	Dolomite.
			5,340 tons	48,060	Magnesite.
				124,456	Cement, manganese, mineral water.
[6]		164,300	7,000 tons	24,500	Dolomite.
				418,687	Cement, magnesite, mineral water.
		207,250	18,000 tons	57,750	Dolomite.
				921,082	Cement, magnesite, mineral water.
		269,334		1,116,759	Asbestos, cement, dolomite, magnesite, mineral water, quicksilver.

MINERAL PRODUCTION OF

Year	Quicksilver		Lime		Gypsum	
	Flasks	Value	Barrels	Value	Tons	Value
1922	[6]					
1923	[6]					
1924	4,670	$320,758				
1925	6,085	486,797				
1926	[6]					
1927	4,380	485,409				
1928	3,800	452,345				
1929	[6]					
1930	[6]		[6]			
1931	4,120	349,619	[6]			
1932	594	31,036	[6]			
1933	711	38,765				
1934	746	52,699				
1935	791	55,015				
1936	640	50,271				
1937	1,756	146,524				
1938	[6]					
1939	3,860	360,567				
1940	6,164	1,062,539				
1941	6,254	1,077,693				
1942	8,873	1,560,982				
1943	[6]					
Totals	[6]394,614	$25,372,353	[6]193,353	$189,428	58,712	$238,795

Grand total value, $56,059,851.

[1] Includes crushed rock, rubble, rip-rap, sand, gravel.
[2] Production of New Idria Mine from 1858-1866; yearly details not obtainable, though New Idria began operation in 1850.
[3] Estimated output of Cerro Bonito, Monterey and Stayton mines, 1870-1877; yearly details concealed under heading of 'various mines' in early reports.
[4] Includes bituminous rock.
[5] Flasks of 76½ pounds previous to June, 1904; of 75 pounds thence, through 1927; of 76 pounds since January, 1928.
[6] See under 'Unapportioned.'

SAN BENITO COUNTY, 1865-1943—Continued

Mineral water		Miscellaneous stone,[1] value	Miscellaneous and unapportioned		
Gallons	Value		Amount	Value	Substance
[6]	------------	$259,805	6,650 tons	$30,100	Dolomite.
			------------	1,504,343	Asbestos, cement, magnesite, mineral water, quicksilver.
[6]	------------	424,854	------------	1,853,049	Asbestos, cement, dolomite, magnesite, mineral water, quicksilver.
[6]	------------	269,369	------------	1,554,476	Asbestos, cement, coal, dolomite, magnesite, mineral water.
------------	------------	351,363	------------	1,779,236	Asbestos, cement, dolomite, magnesite, mineral water.
------------	------------	328,460	------------	2,072,390	Antimony, asbestos, cement, dolomite, magnesite, mineral water, quicksilver.
------------	------------	371,050	------------	1,045,395	Antimony, asbestos, cement, mineral water, pyrite.
[6]	------------	[6]	------------	1,202,373	Cement, magnesite, mineral water, pyrite, miscellaneous stone.
------------	------------	[6]	------------	1,908,462	Cement, magnesite, quicksilver, miscellaneous stone.
------------	------------	[6]	------------	1,389,490	Cement, lime, magnesite, quicksilver, miscellaneous stone.
------------	------------	[6]	------------	304,665	Bentonite, gems (benitoite), lime, limestone, miscellaneous stone.
------------	------------	142,638	------------	26,250	Bentonite, limestone.
------------	------------	[6]	------------	208,714	Other minerals.
------------	------------	[6]	------------	214,158	Bentonite and miscellaneous stone.
------------	------------	[6]	------------	187,239	Bentonite, miscellaneous stone.
------------	------------	[6]	------------	298,541	Bentonite, coal, miscellaneous stone.
------------	------------	[6]	------------	357,986	Bentonite, coal, dolomite, miscellaneous stone.
------------	------------	[6]	------------	527,192	Bentonite, coal, dolomite, quicksilver, miscellaneous stone.
[6]	------------	[6]	------------	186,526	Bentonite, dolomite, mineral water, miscellaneous stone.
------------	------------	[6]	------------	338,957	Dolomite, gems, miscellaneous stone.
------------	------------	[6]	------------	910,512	Antimony, cement, dolomite, miscellaneous stone.
------------	------------	[6]	------------	1,543,072	Antimony, cement, dolomite, miscellaneous stone.
------------	------------	[6]	------------	3,528,462	Cement, chromite, dolomite, manganese ore, quicksilver, miscellaneous stone.
[6]128,720	$25,415	[6]$4,259,735	------------	$25,372,353	

MINERAL PRODUCTION OF

Year	Gold, value	Silver, value	Brick		Gems, value	Granite, value	Mineral water	
			M	Value			Gallons	Value
1880	$81,558							
1881	60,000							
1882	100,000							
1883	50,000	$5,000						
1884	65,000	5,000						
1885	95,125	2,000						
1886	140,450	78,758						
1887	66,900	198,537						
1888	160,000	192,000						
1889	275,440	25,740						
1890	453,800	100						
1891	467,000							
1892	396,518	2,051						
1893	105,860							
1894	266,409	190						
1895	344,308	600					48,000	$11,500
1896	560,578	40					45,000	35,000
1897	592,328						25,000	5,000
1898	673,196	300	672	$2,688		$4,875	4,320	3,000
1899	333,650		860	4,300		8,150	12,000	6,000
1900	335,937	[2]9,500	734	3,261	$500	9,900	6,500	3,250
1901	413,320	[2]2,800	1,158	5,791	20,000	22,400	6,000	3,000
1902	338,877	1,994	688	3,440	150,000	13,175	5,158	1,289
1903	461,516	1,444	2,150	11,150	100,000	16,308	6,000	3,000
1904	334,697	100	3,824	23,700	136,000	7,851		
1905	109,712	100	3,190	28,350	66,000	10,250		
1906	[3]		3,950	34,900	284,500	10,250		
1907	7,455	35	4,474	36,430	206,336	23,650	2,000	2,000
1908	6,920	86	2,112	16,719	121,500	10,000	9,810	11,772
1909	12,812	1,721	5,844	38,946	125,000		10,210	12,022
1910	[4]		8,813	62,647	110,300		40,550	30,110
1911	[4]		9,500	68,000	25,000		60,090	87,020
1912			10,500	80,000	12,500		52,060	17,218
1913			9,384	68,400	7,465		41,500	15,225
1914			5,457	56,392	1,150		8,865	911
1915	1,364	9	1,260	21,025	2,465		10,350	1,035
1916			4,001	36,842	2,710	[3]	[3]	
1917		[3]	and	tile 21,423	[3]	[3]	[3]	
1918				29,080		[3]	[3]	
1919	1,470	12		[3]	[3]	15,215	[3]	
1920				87,612	2,100	7,838		
1921	[3]	[3]		[3]	1,405	22,444	70,924	9,161
1922	[3]	[3]			400	35,673	71,781	9,262

1 Includes crushed rock, rubble, rip-rap, sand, gravel, paving blocks, grinding-mill pebbles.
2 Recalculated to 'commercial' from 'coining value' as originally published.
3 See under 'Unapportioned.'
4 Included under Imperial County production.

AN DIEGO COUNTY, 1880-1943

Salt Tons	Salt Value	Miscellaneous stone,[1] value	Miscellaneous and unapportioned Amount	Miscellaneous and unapportioned Value	Miscellaneous and unapportioned Substance
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------	------	------	------	------	
700	$5,000	$49,374	50 tons	$2,250	Asbestos.
700	5,000	25,000	------	------	
600	4,800	3,573	------	------	
650	5,850	23,390	------	------	
600	5,000	5,359	------	------	
600	5,000	18,198	31,000 lbs.	1,317	Lead.
			124 tons	4,600	Lithia mica.
600	4,000	14,403	440 tons	11,000	Lithia mica.
1,060	9,620	6,887	1,100 tons	27,500	Lithia mica.
7,900	7,900	14,175	822 tons	31,880	Lithia mica.
		42,597	700 tons	27,300	Lithia mica.
------	------	200,192	641 tons	25,000	Lithia mica.
------	------	16,507	4,808 lbs.	750	Copper.
			25 tons	276	Lithia mica.
6,000	5,000	49,378	------	------	
7,000	55,000	28,500	13,246 lbs.	2,659	Copper.
			971 lbs.	52	Lead.
			4,000 cu. ft.	12,000	Marble.
7,000	60,000	37,122	------	------	
15,000	60,000	33,510	------	214,634	Unapportioned, 1900-1909.
8,000	24,000	147,817	------	------	
13,000	37,500	201,488	------	------	
12,450	31,350	164,115	403 tons	500	Pottery clay.
20,500	51,750	170,014	838 tons	2,840	Pottery clay.
15,300	46,200	210,250	30 lbs.	4	Copper.
17,616	19,616	163,723	------	1,365	Other minerals.
			3,008 lbs.	526	Copper.
			23 lbs.	1	Lead.
3	------	163,925	2,150 tons	175,804	Potash.
			16,806 lbs.	4,134	Copper.
			------	13,140	Granite, lithia, mineral water, salt.
4,500	9,750	125,855	283 tons	613	Pottery clay.
			153,349 lbs.	43,502	Copper.
			5,252 tons	1,492,123	Potash.
			------	21,055	Pottery clay, gems, granite, lithia, mineral water, molybdenum, silica, silver.
10,631	61,717	184,158	4,143 lbs.	1,023	Copper.
			700 tons	3,600	Feldspar.
			10,392 tons	1,578,874	Potash.
			------	83,698	Granite, lithia, mineral water.
12,400	52,800	141,996	------	62,929	Clay and clay products.
			------	68,790	Copper, gems, lithia, mineral water, potash, silica.
15,330	77,100	333,847	5,852 tons	57,522	Pottery clay.
			2,953 tons	17,715	Feldspar.
			7,557 tons	18,893	Silica (glass sand).
			------	191,602	Lithia, magnesium salts, mineral water, tantalum ore (columbite).
3	------	187,922	------	92,600	Clay and clay products.
			370 tons	725	Glass sand.
			1,850 tons	11,100	Feldspar.
			------	176,036	Gold, lithia, magnesium salts, marble, salt, silver.
3	------	355,810	3,500 tons	29,500	Feldspar.
			------	93,045	Clay and clay products.
			------	133,117	Fuller's earth, gold, lithia, mganesium salts, marble, salt, silica, silver.

MINERAL PRODUCTION OF

Year	Gold, value	Silver, value	Brick M	Brick Value	Gems, value	Granite, value	Mineral water Gallons	Mineral water Value
1923	$822	$144	[3]	[3]	$8,530	$40,000	59,795	$6,570
1924	4,830	97	----------	$232,113	1,925	94,006	107,097	8,642
1925	5,134	58	----------	119,165	9,413	108,703	81,374	21,137
1926	10,543	340	----------	230,484	4,000	45,327	156,380	23,259
1927	11,490	92	----------	165,170	3,500	63,142	109,685	51,559
1928	2,671	13	----------	101,515	1,700	41,499	71,845	3,592
1929	1,282	5	----------	146,221	2,210	28,884	[3]	----------
1930	2,234	10	----------	[3]	[3]	27,411	[3]	----------
1931	3,988	15	----------	79,633	[3]	10,192	[3]	----------
1932	5,573	32	----------	[3]	[3]	8,963	[3]	----------
1933	5,894	24	----------	[3]	[3]	10,097	[3]	----------
1934	25,514	187	----------	24,506	----------	11,167	[3]	----------
1935	10,367	65	----------	[3]	[3]	10,614	[3]	----------
1936	2,170	12	----------	[3]	[3]	28,000	[3]	----------
1937	2,100	14	----------	[3]	[3]	[3]	[3]	----------
1938	3,080	20	----------	[3]	[3]	[3]	[3]	----------
1939	14,630	166	----------	[3]	[3]	[3]	141,745	5,394
1940	16,975	128	----------	[3]	[3]	14,233	[3]	----------
1941	10,535	36	----------	[3]	[3]	15,391	[3]	----------
1942	245	2	----------	[3]	----------	[3]	[3]	----------
1943	----------	----------	----------	[3]	----------	[3]	[3]	----------
Totals	$7,452,277	$529,577	----------	[3]$1,839,903	[3]$1,406,609	[3]$776,208	[3]1,263,039	$386,878

Grand total value $39,692,755.

[1] Includes crushed rock, rubble, rip-rap, sand, gravel, paving blocks, grinding-mill pebbles.
[3] See under 'Unapportioned.'
[5] Includes bromine, lithia, magnesium chloride, salt, silica.
[6] Includes bromine, feldspar, magnesium chloride, mineral water, salt, silica, tube-mill pebbles.
[7] Includes brick and hollow building tile, bromine, feldspar, gems, magnesium chloride, mineral water, salt, silica (quartz), tube-mill pebbles.
[8] Includes bromine, gems, magnesium chloride, mineral water, salt, silica (quartz), tube-mill pebbles, paving blocks.
[9] Includes bentonite, brick and hollow building tile, bromine, clay (pottery), feldspar, gems, magnesium chloride, mineral water, salt, silica (quartz), tube-mill pebbles.
[10] Includes brick and hollow building tile, bromine, clay (pottery), feldspar, grinding-mill pebbles, magnesium chloride, mineral water, salt, silica (quartz).
[11] Includes bromine, clay (pottery), copper, feldspar, magnesium chloride, mineral water, salt, silica (quartz), tube-mill pebbles.
[12] Includes brick and hollow tile, bromine, pottery clay, granite, magnesium chloride, feldspar, salt, quartz.
[13] Includes brick and hollow tile, bromine, pottery clay, feldspar, gems, magnesium chloride, mineral water, salt.
[14] Includes brick and hollow tile, bromine, pottery clay, feldspar, gems, magnesium chloride, mineral water, salt, tube-mill pebbles, strontium.
[15] Includes brick and hollow tile, bromine, pottery clay, feldspar, gems, magnesium chloride, mineral water, salt, quartz, tungsten ore, tube-mill pebbles.
[16] Bentonite, brick and hollow tile, bromine, feldspar, granite, magnesium chloride, mineral water, salt, silica, tube-mill pebbles.
[17] Bentonite, brick and hollow tile, bromine, clay (pottery), granite, magnesium chloride, mineral water, salt, tube-mill pebbles.

SAN DIEGO COUNTY, 1880-1943—Continued

Salt		Miscellaneous stone[1], value	Miscellaneous and unapportioned		
Tons	Value		Amount	Value	Substance
----------	----------	$343,959	5,603 tons	$100,977	Pottery clay.
			6,100 tons	42,800	Feldspar.
			----------	277,394	Brick and tile, fuller's earth, lead, magnesium chloride, marble, salt, silica (quartz).
[3]	----------	379,094	12,783 tons	36,941	Pottery clay.
			6,850 tons	47,950	Feldspar.
			109 tons	2,269	Lithia.
			----------	205,252	Arsenic, fuller's earth, magnesium chloride, salt.
[3]	----------	508,538	26,976 tons	66,427	Clay (pottery).
			----------	291,182	Feldspar, fuller's earth, lime, magnesium chloride, salt, silica.
[3]	----------	529,640	30,187 tons	58,269	Clay (pottery).
			7,000 tons	54,000	Feldspar.
			----------	258,462	Bromine, copper, fuller's earth (filtering clay), lead, lithia, magnesium chloride, salt, zinc.
[3]	----------	889,642	16,190 tons	31,765	Clay (pottery).
			7,396 tons	69,661	Fuller's earth.
			----------	333,410	Bromine, feldspar, lithia, magnesium chloride, paving blocks, salt, heptane.
[3]	----------	1,284,741	33,396 tons	63,898	Clay (pottery).
			12,836 tons	82,255	Feldspar.
			5,488 tons	47,740	Fuller's earth.
			----------	140,629	Other minerals.[5]
[3]	----------	777,481	20,148 tons	34,020	Clay (pottery).
			8,414 tons	78,944	Fuller's earth.
			----------	378,240	Other minerals.[6]
[3]	----------	651,926	15,517 tons	25,785	Clay (pottery).
			5,297 tons	55,696	Fuller's earth.
			----------	539,985	Other minerals.[7]
[3]	----------	411,004	6,416 tons	69,010	Bentonite (fuller's earth).
			11,421 tons	15,487	Clay (pottery).
			4,165 tons	54,620	Feldspar.
			----------	208,506	Other minerals.[8]
[3]	----------	187,671	----------	172,937	Other minerals.[9]
[3]	----------	374,796	----------	230,070	Other minerals.[10]
[3]	----------	212,884	----------	213,008	Other minerals.[11]
[3]	----------	198,070	8,323 lbs.	333	Lead.
			----------	251,938	Other minerals.[9]
[3]	----------	313,808	----------	238,566	Other minerals.[10]
[3]	----------	312,930	----------	276,426	Other minerals.[12]
[3]	----------	285,223	7,023 lbs.	688	Copper.
			----------	246,711	Other minerals.[13]
[3]	----------	358,625	----------	248,946	Other minerals.[12]
[3]	----------	550,997	----------	262,874	Other minerals.[14]
[3]	----------	1,128,780	----------	257,192	Other minerals.[15]
[3]	----------	821,816	9,902 tons	12,266	Pottery clay.
			----------	604,571	Other minerals.[16]
[3]	----------	1,296,838	----------	353,748	Other minerals.[17]
[3]178,107	$643,953	$14,867,908	----------	$11,789,442	

MINERAL PRODUCTION OF SAN FRANCISCO COUNTY, 1894-1943

Year	Brick		Miscellaneous stone,[1] value	Miscellaneous and unapportioned		
	M	Value		Amount	Value	Substance
1894			$296,864	20 tons	$25	Limestone.
1895			379,696			
1896	5,000	$37,500	285,167			
1897	4,500	28,500	86,217			
1898			129,595			
1899			275,604			
1900			58,400			
1901			156,947			
1902	25,800	238,800	156,300			
1903	33,403	294,326	508,460			
1904	39,509	367,911	332,220			
1905	32,585	310,685	114,357			
1906	7,208	58,289	106,250	8,500 tons	10,500	Glass sand.
1907	44,578	434,140	97,273	4,000 tons	60,000	Asphalt.
1908	41,837	345,155	95,259	1,500 tons	15,000	Asphalt.
1909	31,430	221,332	150,382	850 tons	9,800	Asphalt.
					30,000	Unapportioned, 1900-1909.
1910			108,126	1,000 tons	12,000	Asphaltum.
1911			119,636			
1912			151,147			
1913			110,551			
1914			119,889			
1915			128,270			
1916			76,437			
1917			107,957			
1918			16,463			
1919			65,541			
1920			77,553		2,800	Other minerals.
1921			41,562			
1922			[2]		65,409	Pumice, miscellaneous stone.
1923			117,341			
1924			150,258			
1925			131,158			
1926			112,193			
1927			62,701			
1928			67,430			
1929			75,245			
1930			23,482			
1931			[2]		20,500	Other minerals.[3]
1932			[2]		3,903	Other minerals.[3]
1933			[2]		7,734	Other minerals.[3]
1934			[2]		28,641	Other minerals.[4]
1935			[2]		892	Other minerals.[3]
1936			[2]		23,870	Other minerals.[3]
1937			[2]		41,825	Other minerals.[3]
1938			[2]		2,500	Gold.
					3	Silver.
					31,014	Other minerals.[3]
1939			[2]		7,840	Gold.
					12	Silver.
					44,817	Other minerals.[4]
1940			[2]		2,450	Gold.
					5	Silver.
					49,750	Other minerals.[3]
1941			[2]		665	Gold.
					2	Silver.
					55,520	Other minerals.[3]
1942			[2]		110,140	Gold, miscellaneous stone.
1943			[2]		432,500	Unapportioned.
Totals	265,850	$2,336,638	[2]$5,092,020		$1,070,092	

Grand total value, $8,498,750.

[1] Includes crushed rock, rubble, sand, gravel.
[2] See under 'Unapportioned.'
[3] Includes miscellaneous stone, and mineral water.
[4] Includes miscellaneous stone, mineral water, and platinum.

MINERAL PRODUCTION OF RIVERSIDE COUNTY, 1893[*]-1943

Year	Gold, value	Silver, value	Coal Tons	Coal Value	Salt Tons	Salt Value	Magnesite Tons	Magnesite Value	Brick M.	Brick Value	Pottery clay Tons	Pottery clay Value	Lime and limestone Barrels	Lime and limestone Value	Miscellaneous stone,[1] value	Mineral water Gallons	Mineral water Value	Miscellaneous and unapportioned Amount	Miscellaneous and unapportioned Value	Substance
1891																		125,280 lbs.	$27,564	Tin.
1892																		126,000 lbs.	32,400	Tin.
1893	$42,412																			
1894	93,322		7,891	$16,142	1,981	$3,962					3,700	$4,230	24,000	$19,200	$24,000			50 tons	100	Gypsum.
1895	285,106	$2,550	7,960	15,000	4,000	8,000					7,700	9,400	[3]10,000 20,000	10,000 20,000	27,955			18 tons	144	Gypsum.
1896	262,800	13,450	4,982	9,964	4,317	8,634					22,019	22,750	[3]6,000 15,000	6,000 15,000	17,000					
1897	147,227	4,000	6,282	15,705	4,840	9,680					11,700	11,250						6 tons	160	Mineral paint.
1898	189,188	1,384	6,200	15,000	5,000	10,000			560	$5,800	9,500	10,450	8,000	7,000	8,000			10 tons	200	Asbestos.
1899	163,010	2,000	7,905	10,762	3,600	7,200			4,750	39,500	14,900	16,800	13,476	13,476	8,850			30 tons 1,000 tons	750 1,500	Asbestos. Glass sand.
1900	140,292	6,848	6,000	15,000	4,000	8,000			1,967	28,842	24,560	18,089			57,600			50 tons 200 tons	1,250 200	Asbestos. Glass sand.
1901	109,747	2,150	2,800	7,000	4,000	12,000			3,201	89,787	30,489	19,624	18,000	18,000	53,460			110 tons 500 tons 300 tons	4,400 500 3,000	Asbestos. Glass sand. Gypsum.
1902	47,947	94	1,200	3,000	20,000	20,000			4,153	114,165	34,320	38,920	20,000	17,000	92,996			100 tons 12,000 cu. ft.	500 1,500	Gypsum. Marble.
1903	13,453	136			10,000	20,000			3,817	164,020	53,857	95,332	[3]9,000 25,000	8,600 21,250	152,258			5,000 cu. ft.	2,500	Marble.
1904	7,488	80			15,000	15,000			4,712	71,350	41,966	49,232	20,000	20,000	415,306			20 tons 2,500 cu. ft.	2,400 3,500	Bismuth. Marble.
1905	35,690	346							2,838	69,195	49,720	67,970	20,000	20,000	360,168				2,500	Gems.
1906	4,432	251							4,607	92,140	60,123	57,712	14,000	26,080	171,638				2,500	Gems.
1907	3,386	26					75	$1,750	3,800	102,000	87,260	174,713	6,000	5,500	571,052			3,000 cu. ft. 3,208 lbs. 502 lbs.	9,000 50 170 100	Marble. Gems. Lead. Copper.
1908	5,884	112					2,000	4,000	4,803	74,086	71,231	89,752	[3]8,000 8,300	8,000 8,300	448,478			10 tons 22,665 lbs.	100 2,816	Asbestos. Copper.
1909	180	24					324	3,888	22,037	205,550	86,028	97,971	3,000	3,000	121,827	30,000	$3,000	3 tons 400 tons 8,000 lbs. 	300 2,000 1,015 877,192	Asbestos. Gypsum. Copper. Unapportioned, 1900-1909.
1910	5,585	28					500	4,000	10,267	91,543	101,411	156,844	[3]141,722	120,889	110,357	90,000	9,000	150 tons 	1,500 250	Mineral paint. Gems.
1911	[2]20,623	2,121					575	4,600	3,675	28,572	67,295	79,961			474,018	90,580	11,500	 6,753 lbs. 800 tons	250 844 3,000	Gems. Copper. Glass sand.
1912	20,202	254					878	8,780	2,500	20,000	72,046	93,418	[3]90,831	63,582	567,309	44,250	4,250	 929 lbs. 6,000 lbs. 	800 42 990 3,532,857	Gems. Lead. Copper. Other minerals, 1910-1912.
1913	12,501	104					569	4,552	3,530	30,300	88,936	89,963			536,844	200,000	20,000	1,000 tons 8,971 lbs. 	3,000 1,000 1,391 1,372,314	Gypsum. Gems. Copper. Other minerals.
1914	10,000	100							1,610	36,713	70,136	69,420			208,802	100,000	2,000	36,102 lbs. 5,350 tons 	4,802 7,826 1,241,924	Copper. Gypsum. Other minerals.
1915	10,769	1,522							1,055	16,880	59,614	54,840			213,440	200,000	10,000	3,450 tons 	13,650 1,022,814	Gypsum. Cement, potash, silica.
1916	7,855	338					(4)		1,631	28,593	56,228	56,090			159,555	(4)		32,072 lbs. 23,825 lbs. 58,617 lbs. 8,660 cu. ft. 4,220 tons 350 lbs. 901 tons 	1,607 4,169 14,420 4,890 8,340 24 1,624 1,052,505	Lead. Copper. Copper. Granite. Gypsum. Lead. Silica. Cement, feldspar, magnesite, manganese, mineral water, potash.
									and	tile										
1917		(4)					(4)			165,892	70,798	55,491			72,364	(4)		28,838 lbs. 11,097 tons 1,923 tons 1,157 lbs. 770 tons 	7,873 422,900 3,401 3,001 100 2,400 1,227,073	Copper. Feldspar. Granite. Gypsum. Lead. Silica. Cement, fluorspar, gems, magnesite, manganese, mineral water, potash, silver.
1918	392	1,541					(4)			296,540	48,195	80,454			127,962	(4)		19,485 lbs. 2,288 tons 3,791 tons 1,400 tons 	4,813 11,733 3,326 152,693 4,800 1,004,787	Copper. Feldspar. Granite. Manganese. Silica. Cement, fluorspar, gems, gypsum, lead, magnesite, mineral water, potash.
1919	213	415	(4)				(4)			224,379	42,207	81,006			102,399	(4)		16,500 lbs. 200 tons 1,808 tons 3,034 tons 	1,970 17,075 425 49,324 15,112 2,103,760	Copper. Granite. Gypsum. Manganese ore. Silica. Cement, coal, feldspar, fuller's earth, lead, magnesite, mineral water, potash.
1920			(4)							489,209	76,317	129,313			296,499	(4)		1,094 tons 3,195 tons 	6,168 26,408 12,581 4,171,030	Feldspar. Granite. Silica. Cement, coal, gems, gypsum, mineral water, potash.
1921			(4)							376,553	84,224	111,219			431,671	56,400	2,945	2,094 tons 1,625 tons 	14,808 12,852 6,357 3,927,493	Feldspar. Granite. Silica. Cement, coal, gems, potash.
1922										535,772	81,577	181,897			400,560	58,115	19,672	1,087 tons 1,877 tons 	7,609 30,210 11,391 2,059,806	Feldspar. Granite. Silica (quartz). Cement, coal, fluorite (optical).
1923	(4)	(4)								676,584	85,185	246,033			714,899	63,855	5,277	5,000 tons 2,300 tons 	39,000 29,778 15,000 5,367,282	Feldspar. Granite. Silica (quartz) Cement, coal, gems, gold, gypsum, silver.
1924	1,070	581								493,746	121,193	166,092			561,861	78,560	23,021	8,899 lbs. 2,205 tons 26,817 lbs. 3,160 tons 	1,119 20,162 17,680 2,145 24,579 4,195,541	Copper. Feldspar. Granite. Lead. Silica. Cement, coal, gypsum, mica schist.
1925	3,687	2,570								533,650	74,787	155,315			542,020	(4)		23,134 lbs. 1,990 tons 135,872 lbs. 8,121 tons 	3,285 16,090 32,234 11,821 84,708 3,793,730	Copper. Feldspar. Granite. Lead. Silica (quartz). Cement, coal, gypsum, mineral water.
1926	2,931	3,135								610,100	58,528	178,393			1,180,278	(4)		22,125 lbs. 26,140 tons 173,207 lbs. 20,587 tons 	3,096 71,907 13,857 72,510 4,058,056	Copper. Gypsum. Lead. Silica (quartz). Cement, feldspar, mineral water, onyx, slate.
1927	1,492	1,919								696,795	118,510	198,330			1,244,043	(4)		19,201 lbs. 121,667 lbs. 14,262 tons 	2,515 7,665 60,991 1,244,043	Copper. Lead. Silica. Cement, feldspar, granite, gypsum, lime, mineral water, onyx, zinc.
1928	2,180	1,563								499,612	115,538	543,671	(4)		557,504	(4)		13,263 lbs. 99,097 lbs. 7,804 tons 	1,910 5,747 27,632 4,636,082	Copper. Lead. Silica (quartz). Cement, feldspar, granite, gypsum, limestone, manganese, mineral water, slate, tin.
1929	244	782								544,850	184,179	319,130			454,589	(4)		1,471 lbs. 28,140 tons 	259 41,647 4,040,359	Copper. Silica (quartz and glass sand). Cement, feldspar, granite, gypsum, mineral water, tin.
1930	4,833	38								(4)	102,410	180,727			284,072	(4)		5,878 lbs. 283 tons 4,217 tons 	764 1,742 17,076 2,730,784	Copper. Feldspar. Silica (quartz and glass sand). Asbestos, brick and hollow tile, cement, gypsum, granite, mineral water.
1931	2,524	13								(4)	56,341	79,068			248,623	(4)		401 lbs. 1,939 lbs. 	39 72 2,195,267	Copper. Lead. Brick and hollow tile, cement, feldspar, gems, granite, gypsum, mineral water, silica (quartz and glass sand).
1932	20,788	127								(4)	23,058	29,639			204,218	(4)			1,426,883	Brick and hollow tile, cement, gems, copper, gypsum, lead, mineral water, silica (quartz and glass sand).
1933	14,993	105								(4)	18,228	32,965			237,827	(4)		663 lbs. 	42 1,932,806	Copper. Brick and hollow tile, cement, gems, gypsum, lead, mineral water, silica (glass sand).
1934	41,899	429								(4)	16,081	35,101			136,632	(4)		1,606 lbs. 1,207 lbs. 	128 45 2,376,911	Copper. Lead. Brick and hollow tile, cement, gems, gypsum, manganese ore, mineral water, silica (glass sand).
1935	112,057	1,953								(4)	54,356	73,809			106,623	(4)		2,073 lbs. 15,393 lbs. 	172 616 1,871,393	Copper. Lead. Brick and hollow tile, cement, gems, gypsum, manganese ore, mineral water, glass sand.
1936	216,125	4,827								(4)	66,151	105,975			341,703	(4)		6,355 lbs. 53,983 lbs. 	585 2,483 3,777,472	Copper. Lead. Brick and hollow tile, cement, gems, gypsum, vermiculite mica, mineral water, glass sand.
1937	215,040	4,260								(4)	64,462	117,798			342,073	(4)		4,028 lbs. 	238 3,377,709	Lead. Brick and hollow tile, cement, granite, gypsum, mineral water, glass sand.
1938	77,000	3,387								(4)	47,977	87,489	(4)		319,796	(4)		15,044 lbs. 241,510 lbs. 	1,479 11,109 2,806,533	Copper. Lead. Brick and hollow tile, cement, granite, gypsum, limestone, mineral water, glass sand, paving blocks.
1939	94,395	11,604								(4)	59,030	115,120	(4)		271,545	(4)		88,683 lbs. 634,071 lbs. 	7,143 29,801 2,658,294	Copper. Lead Brick and hollow tile, cement, granite, gypsum, limestone, mineral water, glass sand
1940	83,160	22,510								(4)	61,291	124,338	(4)		381,803			22,269 lbs. 536,457 lbs. 	2,516 26,823 3,277,597	Copper. Lead. Brick and hollow tile, cement, granite, gypsum, limestone, mineral water, sandstone, glass sand, paving blocks.
1941	59,430	23,040								(4)	122,261	252,371	(4)		1,327,548				4,688,623	Brick and hollow tile, cement, granite, gypsum, limestone, mineral water, glass sand, sandstone.
1942	12,180	129								(4)	148,887	308,535	(4)		1,266,888	(4)			5,683,367	Brick, cement, copper, dolomite, granite, gypsum, limestone, manganese, mineral water, silica (glass sand), tungsten.
1943										(4)	120,574	214,915	(4)		483,408	(4)			4,754,324	Brick and hollow tile, cement, granite, gypsum, limestone, manganese ore, mineral water, silica (glass sand), tungsten.
Totals	$2,615,188	$122,855	[4]51,210	$116,673	76,738	$122,476	[4]4,921	$31,670		[4]$7,512,745	3,247,883	$5,635,618		$425,697	$17,503,751	[4]1,011,766	$107,666		$95,678,531	

Grand total value, $129,772,672.

* Riverside County was created March 11, 1893, from portions of San Bernardino and San Diego Counties.
1 Includes granite, crushed rock, gravel, sand paving blocks.
2 Includes part of Los Angeles County.
3 Tons of limestone.
(4) See under 'Unapportioned.'

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San Bernardino County

San Bernardino County

San Bernardino County

MINERAL PRODUCTION OF SAN BERNARDINO COUNTY, 1880-1943 *

Year	Gold, value	Silver, value	Copper, Pounds	Copper, Value	Lead, Pounds	Lead, Value	Borates, value	Gypsum, Tons	Gypsum, Value	Salt, Tons	Salt, Value
1880											
1881	$9,000	$100,000									
1882	20,000	150,000									
1883	30,000	1,050,000									
1884	33,000	2,550,000									
1885	23,000	2,363,436									
1886	56,454	1,204,750									
1887	27,850	1,153,268									
1888	25,000	1,200,000									
1889	10,737	621,920									
1890	17,336	795,465									
1891	82,979	711,167									
1892	47,637	67,073									
1893	158,000	447,020									
1894	130,420	148,243					$726,500			1,000	$3,000
1895	131,380	219,410					655,900			3,841	20,101
1896	96,723	130,714					650,600			3,000	15,000
1897	100,373	54,407					1,080,000				
1898	261,812	32,000					1,120,000				
1899	164,590	125,603	1,389,878	$232,339			1,106,000				
1900	247,949	172,759	1,020,000	207,000	10,000	$400	999,340				
1901	309,603	87,164	60,000	7,575	600	20	898,130				
1902	394,036	58,972	339,480	41,008	59,340	2,076	2,198,600				
1903	581,197	59,199	60,400	7,552	14,000	504	408,000				
1904	595,828	13,025	169,477	17,270							
1905	473,893	10,595	52,008	8,206							
1906	354,830	33,765	514,031	99,207							
1907	158,676	81,339	514,292	102,856	34,211	1,822					
1908	190,611	33,704	516,049	71,079	409,570	17,218		20,000	$70,000	60	650
1909	40,071	12,670	316,300	40,418	310,200	13,254		12,500	43,000	3,500	14,000
1910	33,093	10,184	5,412	689	134,312	5,972		31,519	70,367	3,000	9,000
1911	127,367	25,542	666,489	83,311	161,338	7,260		20,584	66,505	3,600	13,600
1912	293,900	49,982	1,637,185	319,636	94,552	4,268		21,000	67,000	3,000	12,000
1913	356,324	44,413	497,852	77,107	279,241	12,287		25,000	74,000	3,049	10,573
1914	205,000	40,000	19,069	2,536	45,110	1,759		17,332	49,150	482	2,892
1915	416,987	54,165	209,440	36,652	169,165	7,952		ⓐ		542	3,324
1916	279,813	67,146	1,677,001	388,164	673,801	40,492		ⓐ		2,356	13,830
1917	154,976	88,930	1,220,356	333,187	2,203,541	197,246		ⓐ			
1918	29,225	28,712	1,580,908	390,507	667,978	47,426		ⓐ			
1919	39,769	427,717	256,933	47,760	105,796	5,607	ⓐ	19,013	50,154		
1920	79,196	1,212,957	6,386	901	116,876	9,270	440,411	ⓐ		202	1,220
1921	217,368	3,210,706	17,054	2,200	22,812	1,027	338,905	ⓐ		13,279	67,782
1922	125,728	2,374,918	13,452	1,816	11,188	616	ⓐ	ⓐ		12,222	64,259
1923	210,923	2,225,659	13,328	1,959	34,477	2,113	ⓐ	ⓐ		17,350	65,650
1924	187,573	1,631,598	17,667	2,314	31,668	2,533				29,690	69,791
1925	157,374	1,378,392	6,249	858	61,450	5,349				28,319	101,088
1926	106,875	551,644	171,232	23,972	195,536	15,643				22,522	85,463
1927	82,225	447,125	197,132	25,824	125,602	7,919					
1928	91,717	352,741	106,361	15,314	38,097	2,209				42,744	186,470
1929	44,984	189,756	81,846	14,405	53,632	3,373				24,949	114,796
1930	59,442	178,496	40,622	6,281	45,653	2,283	ⓐ			ⓐ	ⓐ
1931	54,600	32,453	6,072	553	15,763	585	ⓐ			ⓐ	
1932	137,979	50,241	6,183	387	23,371	701	ⓐ			ⓐ	
1933	116,074	53,847	7,371	504	27,936	1,024	ⓐ				
1934	501,994	147,597	28,806	2,048	105,497	3,829	ⓐ			ⓐ	
1935	279,020	114,730	19,553	1,623	133,776	4,951	ⓐ			ⓐ	
1936	140,105	182,343	10,110	930	115,621	5,318	ⓐ			ⓐ	
1937	218,025	277,542	28,760	3,480	106,211	6,260	ⓐ			ⓐ	
1938	409,290	166,351	24,723	2,423	88,888	4,089	ⓐ				
1939	372,030	128,547	43,128	4,486	62,389	2,932	ⓐ				
1940	515,410	163,338	50,913	5,733	31,376	1,569	ⓐ				
1941	699,145	118,535	111,077	13,197	78,001	4,502	ⓐ				
1942	338,275	46,732	157,196	19,031	59,498	2,986	ⓐ			160,181	473,780
1943	82,330	6,336	55,875	11,154	239,814	17,962	ⓐ			ⓐ	
Totals	$11,614,388	$29,635,728	15,041,416	$2,465,752	7,375,814	$482,521	$19,009,296	[a]167,548	$490,100	[a]375,026	$1,308,946

Year	Cement, Barrels	Cement, Value	Lime, Barrels	Lime, Value	Limestone, Tons	Limestone, Value	Brick, M	Brick, Value	Marble, Cubic feet	Marble, Value	Miscellaneous stone,[1] value	Gems, value
1880–1893												
1894	9,000	$31,000	40,000	$32,000	5,000	$6,230					631,622	
1895	16,263	32,556	87,864	67,674	50,000	30,000					37,072	
1896	9,000	27,000	37,427	34,977	17,500	17,500			600	63,000	28,476	
1897	18,000	68,000	12,000	12,000								
1898	50,000	150,000	80,000	36,000	6,000	6,600	2,000	$16,800	1,200	8,000	15,040	
1899	60,000	180,000	16,000	16,100	10,440	14,810	1,000	8,000	4,500	628	11,276	
1900	82,000	121,000	20,261	33,261	7,067	7,067					68,757	$20,000
1901	71,800	159,842	38,763	43,028	54,210	76,710					166,777	20,000
1902	96,000	273,600	70,582	65,932	48,996	81,678	80	1,800	8,003	15,600	102,400	11,000
1903	100,000	167,000	30,023	28,602	52,813	64,618	100	8,000	38,000	41,600	266,961	10,000
1904			25,000	21,600	28,421	42,678	2,500	17,600	31,116	63,400	154,690	
1905			17,024	14,740	27,387	81,305			40,100	40,000	147,197	56,000
1906			20,910	17,140	19,837	35,990	1,800	13,500	7,200	25,000	38,476	
1907			8,000	8,000	74,709	139,188	1,666	15,556	6,482	29,946	147,942	
1908					104,230	97,466	1,060	7,350	180	600	231,242	200
1909					22,197	41,308	1,700	11,966	60,000	125,000	173,777	200
1910					224,610	167,716	1,910	11,400			95,126	1,120
1911					245,102	177,080			136	408	167,213	
1912	[2]2,301,000	2,996,300			80,150	97,867	1,340	8,040			550,624	460
1913	ⓐ		121,544	113,856	25,896	35,454	350	2,100			354,312	650
1914	ⓐ		84,637	93,100	23,006	29,950	25	1,350			131,978	
1915	918,000	939,000	ⓐ		68,500	69,600	400	2,400	ⓐ		178,528	
1916	1,036,000	1,246,000	151,070	54,317	63,174	63,480	ⓐ				172,454	1,000
1917	1,323,931	1,673,054	ⓐ		ⓐ		ⓐ				111,158	
1918	1,027,635	1,433,902	ⓐ		10,852	13,323			ⓐ		48,451	ⓐ
1919	1,078,943	1,717,908	ⓐ								183,338	ⓐ
1920	1,091,283	3,051,079	ⓐ		ⓐ						169,691	ⓐ
1921	1,964,926	4,633,437	ⓐ		21,462	100,105					145,672	ⓐ
1922	2,770,053	4,166,430	ⓐ		2,200	7,800					ⓐ	
1923	3,554,784	8,478,612	ⓐ		5,859	28,324					351,151	
1924	4,354,119	7,571,370	ⓐ		14,375	45,137					335,946	
1925	5,079,281	8,828,044	17,405	124,446	13,239	27,509					395,048	
1926	5,135,840	9,273,627	13,680	98,310	11,226	49,504					404,681	
1927	5,357,330	9,823,839	12,170	92,363	559,011	348,384					311,470	
1928	4,383,383	7,137,606	14,016	106,312	11,201	40,224					329,541	ⓐ
1929	3,576,005	4,603,301	10,145	77,340	15,526	40,753					629,111	1,540
1930	ⓐ	ⓐ	ⓐ	ⓐ	ⓐ	ⓐ	ⓐ	ⓐ			406,912	
1931	ⓐ		ⓐ		15,128	56,508	ⓐ				406,246	ⓐ
1932	ⓐ		ⓐ		8,619	23,717	ⓐ				407,230	ⓐ
1933	ⓐ		ⓐ		ⓐ		ⓐ				146,154	
1934	ⓐ		3,996	30,846	11,210	20,749	ⓐ				165,057	
1935	ⓐ		ⓐ		ⓐ		ⓐ				199,292	
1936	ⓐ		ⓐ		19,046	52,046	ⓐ		ⓐ		209,337	ⓐ
1937	ⓐ		ⓐ		25,967	76,850	ⓐ		ⓐ		307,337	
1938	ⓐ		ⓐ		ⓐ		ⓐ		ⓐ		279,616	
1939	ⓐ		ⓐ		ⓐ		ⓐ		ⓐ		173,963	
1940	ⓐ		ⓐ		ⓐ		ⓐ		ⓐ		174,414	
1941	ⓐ		ⓐ		30,603	83,600	ⓐ		ⓐ		305,804	
1942	ⓐ				57,678	148,530	ⓐ				2,075,601	ⓐ
1943	ⓐ				60,614	142,090	ⓐ				937,463	ⓐ
Totals	[a]40,281,488	$78,812,187	[a]928,726	$2,330,440	2,092,490	$2,541,628	[a]15,909	$125,724	[a]185,388	$343,970	$13,003,891	[a]$131,660

Miscellaneous and unapportioned

Year	Amount	Value	Substance
1904	4,000 cu. ft.	$2,000	Sandstone.
1906	10 tons	5,500	Tungsten.
1909	300 tons	3,000	Pottery clay.
		4,056,856	Unapportioned, 1900-1909.
1910	430 tons	4,300	Pottery clay.
	108,000 gals.	25,000	Mineral water.
	60 tons	840	Barytes.
	100 tons	1,000	Soapstone.
1911	920 tons	4,060	Pottery clay.
1912	360 tons	350	Pottery clay.
	200 tons	1,300	Mineral paint.
	50 tons	550	Barytes.
1913	4,500 gals.	3,000	Mineral water
		1,391,304	Other minerals.
1914	44,100 gals.	5,100	Mineral water.
	80 tons	661	Mineral paint.
	140 tons	400	Glass sand
		1,240,575	Other minerals.
1915	37,480 gals.	7,350	Mineral water.
	864 tons	840,947	Tungsten concentrates.
	39,848 lbs.	4,941	Zinc.
		52,316	Dolomite, gypsum, lime, manganese, marble, mineral paint, soapstone, and talc.
1916	7,500 cu. ft.	2,500	Granite.
	49,500 gals.	6,500	Mineral water.
	1,021 tons	3,915,434	Tungsten concentrates.
	707,052 lbs.	94,746	Zinc
		217,265	Brick, dolomite, feldspar, gypsum, manganese, mineral paint, pumice, potash, talc, strontium.
1917		2,350	Granite.
		187,571	Lime and limestone.
	235 tons	6,060	Manganese
	11,300 gals.	1,620	Mineral water.
	14,570 tons	2,049,120	Potash.
	3,050 tons	37,000	Strontium.
	1,943 tons	2,447,720	Tungsten concentrates.
	38,733 lbs.	3,951	Zinc.
		114,834	Brick, pottery clay, dolomite, feldspar, gems, gypsum, iron ore, mineral paint, salt, soda, talc.
1918	270 tons	810	Dolomite.
	601,500 gals.	60,150	Mineral water.
	27,545 tons	3,428,443	Potash.
	430 tons	4,210	Talc.
	2,000 tons	33,000	Strontium.
	1,347 tons	1,911,966	Tungsten concentrates.
	2,824 lbs.	257	Zinc.
		122,349	Gems, granite, gypsum, iron ore, lime, magnesite, marble, mineral paint, salt.
1919	300,060 gals.	32,006	Mineral water.
	21,171 tons	1,670,919	Potash.
	3,601 tons	19,948	Talc
		443,492	Borax, pottery clay, dolomite, gems, lime, tungsten.
1920	95 tons	860	Pottery clay.
	1,110,190 gals.	166,726	Mineral water.
	15,435 tons	1,052,037	Potash
		336,551	Dolomite, gems, granite, gypsum, iron ore, lime, limestone, soda, talc.
1921	683 tons	22,980	Calcium chloride
	7,202 tons	211,067	Potash.
	2,750 tons	43,375	Talc.
		374,726	Pottery clay, dolomite, feldspar, gems, granite, gypsum, iron ore, lime, mineral water, pumice, soda.
1922		1,826,304	Borax, calcium chloride, fuller's earth, gems, gypsum, lime, mineral water, potash, soda, talc, miscellaneous stone.
1923	830 tons	12,630	Clay (pottery).
	7,248 tons	123,216	Talc.
		2,276,316	Borates, calcium chloride, gems, gypsum, lime, mineral water, potash, soda (trona), tungsten concentrates.
1924	7,234 tons	125,926	Talc.
		2,720,243	Borates, calcium chloride, clay (pottery), fuller's earth, gypsum, lime, mineral water, petroleum, potash, soda (trona), tungsten, concentrates.
1925	1,510 tons	11,000	Clay (pottery).
		3,150,468	Borates, calcium chloride, fuller's earth, mineral water, petroleum, potash, soda (trona), talc, tungsten, concentrates.
1926	2,268 tons	10,605	Clay (pottery).
	2,806 tons	73,721	Soda (trona).
	8,134 tons	142,290	Talc.
		3,384,150	Borates, calcium chloride, fuller's earth, magnesite, mineral water, petroleum, potash, silica, tungsten concentrates, zinc.
1927	1,798 tons	26,603	Fuller's earth.
	6,544 tons	49,400	Talc.
		4,925,551	Borates, calcium chloride, clay (pottery), gems, mineral water, onyx, petroleum, potash, salt, silica, soda (trona), talc, tungsten concentrates.
1928	2,100 tons	12,215	Clay (pottery).
		5,873,023	Antimony, borates, calcium chloride, fuller's earth, gems, mineral water, potash, soda, talc, and tungsten.
1929	2,508 tons	15,874	Clay (pottery).
		5,474,119	Barite, borates, calcium chloride, manganese, mineral water, potash, volcanic ash, soda, talc, tungsten.
1930	2,013 tons	14,916	Clay (pottery).
		9,989,971	Barites, borates, brick, calcium chloride, cement, fuller's earth, gems, lime, limestone, manganese ore, mineral water, potash, salt, soda, talc, tungsten.
1931	3,035 tons	29,703	Bentonite.
	1,220 tons	5,333	Pottery clay.
		9,299,304	Barite, borates, brick, calcium chloride, cement, gems, lime, manganese, mineral water, potash, pumice, iron ore, salt, silica (quartz), soda, talc, tungsten.
1932	1,096 tons	6,491	Pottery clay.
		5,626,589	Barite, bentonite, borates, brick, calcium chloride, cement, gems, lime, mineral water, petroleum, potash, salt, soda, talc.
1933	275 tons	2,515	Barite
	1,678 tons	10,042	Bentonite.
	786 tons	6,087	Pottery clay.
	9,531 tons	85,263	Talc.
		8,569,396	Borates, brick, calcium chloride, cement, fluorspar, lime, limestone, mineral water, petroleum, potash, volcanic ash, salt, soda, tungsten.
1934	1,156 tons	7,844	Pottery clay.
		9,849,086	Barite, bentonite, borates, brick, calcium chloride, cement, fluorspar, gems, iron ore, manganese, mineral water, potash, salt, soda, talc, tungsten ore.
1935	4,028 tons	37,605	Bentonite.
	2,623 tons	23,090	Pottery clay.
		9,225,440	Borates, brick, calcium chloride, cement, iron ore, lime, limestone, onyx, mineral water, potash, salt, soda, talc, tungsten ore.
1936	4,974 tons	64,062	Bentonite.
	9,781 tons	49,291	Pottery clay
		14,598,127	Borates, brick, calcium chloride, cement, gems, iron ore, lime, onyx, mineral water, petroleum potash, salt, soda, talc, tungsten ore, zinc.
1937	6,765 tons	60,252	Pottery clay.
	17,279 lbs.	1,123	Zinc.
		16,070,255	Bentonite, borates, brick, calcium chloride, cement, fluorspar, granite, iron ore, lime, onyx, mineral water, salt, soda, petroleum, talc, tungsten ore.
1938	8,504 tons	108,850	Bentonite.
	3,631 tons	26,249	Pottery clay.
		15,756,000	Borates, brick, calcium chloride, cement, granite, iron ore, lithia, lime, limestone, onyx, mineral water, petroleum, potash, salt, serpentine, tungsten ore, zinc.
1939	8,924 tons	44,008	Pottery clay.
		13,637,842	Antimony, bentonite, borates, brick, calcium chloride, cement, marble, iron ore, lime, limestone, lithia, mineral water, petroleum, potash, salt, soda, strontium, talc, tungsten ore, zinc.
1940	4,733 tons	104,612	Bentonite.
	7,043 tons	65,751	Pottery clay.
	21,058 tons	174,414	Talc.
		14,509,420	Antimony, borates, brick, bromine, calcium chloride, cement, feldspar, granite, lime, limestone, lithia, manganese ore, marble, mineral water, petroleum, potash, quicksilver, salt, soda, strontium, tungsten ore.
1941	10,451 tons	97,961	Bentonite.
	8,243 tons	71,686	Pottery clay.
	26,531 tons	263,742	Talc.
		15,371,603	Antimony, borates, brick, bromine, calcium chloride, cement, feldspar, granite, iron ore, lime, lithia, manganese ore, mineral paint, mineral water, potash, quicksilver, salt, quartz, soda, strontium, tungsten ore.
1942	5,032 tons	48,381	Bentonite.
	4,759 tons	32,224	Pottery clay.
	17,894 tons	185,709	Talc.
	30,769 units	723,613	Tungsten ore.
	579,111 lbs.	63,857	Zinc.
	239,941 tons	2,631,637	Soda (soda ash and salt cake).
		17,857,143	Antimony, borates, brick, bromine, calcium chloride, cement, feldspar, gems, granite, iron ore, lithia salts, manganese ore, mineral paint, mineral water, potash, petroleum, sandstone, silica (quartz) not including ganister, strontium.
1943	504,248 tons	1,721,827	Iron ore.
	32,008 tons	318,033	Talc.
	28,172 units	772,226	Tungsten ore.
	1,468,134 lbs.	158,234	Zinc.
		17,875,284	Bentonite, borates, brick, bromine, calcium chloride, cement, clay (pottery), feldspar, gems, granite lithia, manganese ore, mineral water, petroleum, potash, salt, silica (quartz and ganister), soda, strontium.
Totals		$242,539,071	

Grand total value, $396,303,220.

1 Includes crushed rock, rubble, rip-rap, sand, gravel.
2 Combined annual production 1910, 1911, 1912.
ⓐ See under "Unapportioned."
* Reprinted from Division of Mines Bulletin 121 California Mineral Production and Directory of Mineral Producers for 1941, by Henry H. Symons

MINERAL PRODUCTION OF

Year	Brick		Natural gas	
	M	Value	M cubic feet	Value
1885	----	----	----	----
1886	----	----	----	----
1894	----	----	----	$75,000
1895	----	----	----	100,000
1896	7,000	$35,000	----	85,157
1897	5,500	22,000	----	57,411
1898	6,500	34,000	----	57,289
1899	5,500	27,000	102,960	84,880
1900	2,000	20,000	27,000	19,862
1901	2,000	20,000	----	60,456
1902	[2]3,000	[2]18,000	81,481	67,868
1903	[2]4,000	[2]24,000	88,134	44,399
1904	7,500	45,000	106,437	47,635
1905	11,400	68,000	100,950	53,915
1906	7,500	49,500	103,450	55,115
1907	12,250	81,000	101,000	52,723
1908	28,412	189,560	60,903	49,194
1909	8,088	242,634	71,883	149,063
1910	8,744	212,538	313,392	159,451
1911	5,275	49,650	----	114,433
1912	6,128	64,874	----	145,166
1913	6,314	73,768	142,730	67,967
1914	5,793	82,890	154,872	25,900
1915	3,000	75,000	161,923	143,974
1916	10,189	158,722	182,441	141,605
1917	also tile	185,060	348,146	72,585
1918	----	305,475	202,453	60,405
1919	----	231,478	200,943	76,200
1920	----	[3]	200,433	74,957
1921	----	294,712	204,057	79,571
1922	----	[3]	199,389	62,454
1923	----	[3]	----	[3]
1924	14,936	462,688	----	[3]
1925	also tile	472,983	----	----
1926	also tile	511,448	----	----
1927	also tile	630,218	----	----
1928	also tile	512,425	----	----
1929	and tile	607,469	----	----
1930	11,858	478,454	----	----
1931	also tile	308,217	----	----
1932	[3]	----	[3]	----
1933	[3]	----	[3]	----
1934	[3]	----	[3]	----
1935	[3]	----	[3]	----
1936	[3]	----	3,104,068	294,457
1937	----	----	5,740,226	484,381
1938	----	----	5,720,352	503,667
1939	----	57,394	10,432,694	834,694
1940	[3]	----	9,037,712	574,452
1941	[3]	----	10,105,068	659,137

AN JOAQUIN COUNTY, 1885-1943

Manganese		Miscel-laneous stone,[4] value	Miscellaneous and unapportioned		
Tons	Value		Amount	Value	Substance
[1]	-----	-----	-----	$2,500	Gold.
55	$550	-----	275 tons	343	Pottery clay.
280	2,800	-----	-----	-----	
-----	-----	-----	-----	-----	
-----	-----	-----	-----	-----	
-----	-----	-----	-----	-----	
-----	-----	-----	-----	-----	
-----	-----	-----	-----	-----	
-----	-----	-----	273 tons	2,730	Asphalt.
-----	-----	-----	3 tons	90	Infusorial earth.
-----	-----	-----	-----	-----	
-----	-----	$25,000	-----	-----	
-----	-----	-----	-----	-----	
60	1,080	-----	2,000 tons	13,000	Clay.
-----	-----	-----	-----	214,835	Unapportioned, 1900-1909.
260	4,160	-----	-----	-----	
-----	-----	-----	25,510 tons	25,510	Clay.
-----	-----	-----	-----	-----	
-----	-----	900	1,494 tons	18,522	Clay.
			3,000 tons	4,000	Glass sand.
150	1,500	19,440		200	Other minerals.
460	7,400	21,620	-----	400	Other minerals.
6,493	115,460	53,075	-----	-----	
6,320	157,500	55,003	-----	72	Other minerals.
4,281	117,709	47,085	-----	71,299	Gold, platinum, silver.
343	10,274	59,510	-----	71,538	Gold, platinum, silver.
[3]	-----	63,077	-----	333,068	Brick, gold, manganese, platinum, silver.
425	3,750	72,815	-----	23,530	Other minerals.
[3]	-----	[3]	-----	314,269	Brick and clay.
			-----	96,672	Manganese ore, miscellaneous stone.
-----	-----	260,597	-----	472,858	Brick and clay.
			-----	77,774	Manganese ore, natural gas.
-----	-----	83,874	-----	55,938	Manganese ore, natural gas.
-----	-----	103,237	-----	161,598	Other minerals.
-----	-----	129,037	-----	201,515	Other minerals.
-----	-----	81,747	-----	-----	
-----	-----	63,444	-----	49,062	Unapportioned.
-----	-----	135,317	-----	47,105	Unapportioned.
-----	-----	202,307	-----	44,101	Unapportioned.
-----	-----	119,729	-----	34,250	Unapportioned.
			6 oz.	2	Silver.
-----	-----	76,701	-----	1,440	Gold.
			-----	192,349	Brick and natural gas.
			4 oz.	1	Silver.
-----	-----	49,913	-----	1,017	Gold.
			-----	102,196	Brick and hollow building tile, natural gas.
			-----	1,133	Gold.
-----	-----	77,507	3 oz.	2	Silver.
			-----	69,455	Brick and hollow building tile, natural gas.
			-----	99,698	Gold.
-----	-----	93,053	-----	109	Silver.
			-----	223,408	Brick and hollow tile, natural gas.
-----	-----	133,690	-----	32,917	Brick, gold, silver.
			-----	79,765	Gold.
-----	-----	95,869	-----	125	Silver.
			-----	46,480	Other minerals.
			-----	41,580	Gold.
-----	-----	175,530	-----	59	Silver.
			-----	61,071	Other minerals.
			-----	66,185	Gold.
-----	-----	146,369	-----	144	Silver.
			-----	112	Other minerals.
			-----	329,175	Gold.
-----	-----	175,438	-----	648	Silver.
			-----	67,199	Brick and hollow tile pottery clay, platinum.
			-----	830,935	Gold.
-----	-----	251,901	-----	1,430	Silver.
			-----	89,216	Other minerals.

MINERAL PRODUCTION OF

Year	Brick		Natural gas	
	M	Value	M cubic feet	Value
1942	3		11,829,675	839,502
1943	3		12,446,567	888,205
Totals		[3]$7,051,157		[3]$7,363,130

Grand total value, $24,289,768.

1 Production of manganese ore in California began at the Ladd Mine, San Joaquin County, in the Tesla District in 1867. When shipments of this ore to England ceased late in 1874, upwards of 5,000 tons had been produced by that property. Annual amounts earlier than 1894 are not separable.

2 Estimated.

3 See under 'Unapportioned.'

4 Includes crushed rock, rubble, rip-rap, sand, gravel.

SAN JOAQUIN COUNTY, 1885-1943—Continued

Manganese		Miscellaneous stone,[4] value	Miscellaneous and unapportioned		
Tons	Value		Amount	Value	Substance
[3]	------------	475,030	1,894 tons	4,782	Pottery clay.
			------------	633,605	Gold.
			------------	1,253	Silver.
			------------	124,906	Brick and hollow tile, manganese ore, platinum.
[3]	------------	408,304	------------	177,450	Gold.
			------------	314	Silver.
			------------	147,338	Brick and hollow tile, manganese ore, platinum.
[3]19,127	$422,183	$3,756,119	------------	$5,697,179	

MINERAL PRODUCTION OF

Year	Bituminous rock		Brick		Chromite		Gold,[3] value	Mineral water	
	Tons	Value	M	Value	Tons*	Value		Gallons	Value
1876									
1877									
1878									
1879									
1880					[2]17,030	$184,704			
1881					1,790	24,000			
1882							$5,000		
1883					5,558	99,200			
1884									
1885					670	8,880			
1886					980	13,140	9,164		
1887	36,000	$180,000			600	7,980	1,740		
1888	43,000	215,000			300	2,550	3,000		
1889					4,300	66,865	6,260		
1890					687	5,496	8,800		
1891					75	592	1,785		
1892							1,097		
1893							600		
1894	9,432	32,263			[4]800	10,500	1,200		
1895	6,354	17,600	750	$3,750	[4]700	6,650	3,000		
1896	5,113	11,464			[4]200	2,000	3,000		
1897	2,291	5,117					2,500	7,800	$1,960
1898	4,788	18,927	830	5,280			1,000	800	400
1899	10,818	40,288	650	3,500					
1900	3,346	12,905	500	4,000					
1901	9,472	33,070	650	5,200			300	24,000	6,000
1902	1,790	2,327	900	7,650			2,399	4,500	800
1903	3,365	7,572	750	6,000			1,840		
1904							630	4,000	1,000
1905	2,533	6,348	400	3,200			300		
1906	2,533	6,644	300	2,400					
1907	2,167	8,128	2,000	16,000			316	4,800	1,000
1908	5,077	21,875	1,440	12,900				4,800	1,056
1909	2,731	6,369	2,245	19,605				4,000	1,000
1910	1,982	4,016	900	8,000				6,000	1,600
1911	2,710	5,230	2,000	18,000				2,000	1,000
1912	807	1,472						2,500	625
1913	609	1,149	1,750	17,500			124	1,500	600
1914	579	1,118						1,000	250
1915	[6]				[6]			4,500	675
1916	[6]		4,150	45,500	1,855	27,733		2,500	475
1917	[6]		[6]		4,109	92,846		1,500	300
1918					10,443	539,423	[6]	[6]	
1919	[6]				1,158	26,431			
1920					399	10,440			
1921					[6]			[6]	
1922					[6]			[6]	
1923					[6]			[6]	
1924			2,033	35,987				[6]	
1925			[6]		[6]		840	[6]	

* Copper was weighed in tons of 2,360 pounds and chromite in tons of 2,240 pounds, but here converted to 2,000 pounds.

[1] The total production of asphaltum up to 1894 was reported as 800 barrels. This production reduced to tons is shown under 1894.

[2] Although a great deal of chromic iron ore was mined and marketed during the '70's, there are no records of yearly production. The above figure for 1880 represents the total shipments from San Luis Obispo up to August, 1880.

[3] There are no records of annual mineral production for the period of 1865-1876, but there was a small annual gold production from shallow placers before this, and these placers have no doubt yielded considerable gold never reported. The same observation applies to a number of small quicksilver properties worked in the '70's.

[4] Concentrates.

[5] Includes crushed rock, rubble, sand, gravel; also granite and sandstone prior to 1915.

[6] See under 'Unapportioned.'

AN LUIS OBISPO COUNTY, 1876-1943

Petroleum		Quicksilver[3]		Miscel-laneous stone,[5] value	Miscellaneous and unapportioned		
Barrels	Value	Flasks	Value		Amount	Value	Substance
---------	---------	6,428	$282,832	---------	*236,000 lbs.	$7,287	Copper.
---------	---------	3,310	123,463	---------	---------	---------	
---------	---------	2,151	70,768	---------	---------	---------	
---------	---------	779	2,358	---------	---------	---------	
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---------	---------	---------	---------	---------	---------	---------	
---------	---------	---------	---------	$8,772	[1]220 tons 500 cu. ft.	4,400 20,000	Asphaltum (rock). Cal. onyx.
---------	---------	20	800	45,520	400 cu. ft.	4,000	Cal. onyx.
---------	---------	101	3,400	17,407	---------	---------	
---------	---------	101	3,939	13,500	238 cu. ft.	1,000	Cal. onyx.
---------	---------	384	11,660	47,000	---------	---------	
---------	---------	394	17,700	6,740	16 tons	320	Asphaltum (rock).
---------	---------	515	23,886	44,835	---------	---------	
---------	---------	840	41,513	---------	2,000 tons	30,000	Asphaltum (rock).
---------	---------	3,312	147,215	---------	4,000 tons	40,000	Asphaltum (rock).
---------	---------	4,577	183,530	58,374	100 bbls.	100	Lime.
---------	---------	†4,746	176,616	81,000	---------	---------	
---------	---------	3,733	133,748	46,000	---------	---------	
---------	---------	3,511	128,152	35,500	---------	---------	
48,127	$16,845	2,509	95,743	3,000	6,000 tons 300 bbls.	90,000 600	Asphaltum (rock). Lime.
10,000	5,000	867	36,648	900	---------	---------	
30,000	15,000	317	15,510	400	4,500 tons ---------	55,000 218,205	Asphaltum (rock). Unapportioned, 1900-1909.
22,310	11,155	563	25,476	75	13,000 tons	165,000	Asphaltum (rock).
38,092	25,146	569	26,180	---------	---------	---------	
2,129	1,469	666	27,998	---------	---------	---------	
---------	---------	1,160	46,667	134	---------	---------	
---------	---------	1,266	62,097	---------	---------	---------	
---------	---------	1,473	125,542	99,475	---------	1,940	Bituminous rock, chromite.
11,670	5,252	1,227	114,724	49,318	356 lbs. ---------	88 2,717	Copper. Bituminous rock, pottery clay, sandstone.
74,143	68,656	1,565	151,034	8,422	---------	16,886	Bituminous rock, brick, manganese soda.
62,744	56,783	[6]	---------	6,100	1,907 tons ---------	81,926 174,447	Manganese ore. Bituminous rock, copper, gold, mineral water, quicksilver, silver, soda.
31,656	32,922	[6]	---------	20,300	---------	132,777	Bituminous rock, manganese, quicksilver, sandstone, soda.
42,511	59,515	1,224	89,186	[6]	---------	246,463	Copper, granite, manganese, soda miscellaneous stone.
30,725	43,691	---------	---------	80,000	---------	6,100	Chromite, diatomaceous earth, mineral water.
33,856	31,892	---------	---------	107,000	---------	2,578	Chromite, diatomaceous earth, mineral water.
32,988	19,793	---------	---------	46,479	---------	78,977	Chromite, diatomaceous earth, mineral water, quicksilver, soda (salt cake).
31,222	30,972	[6]	---------	113,384	---------	137,436	Mineral water, natural gas, quicksilver, sodium sulphate.
29,590	32,164	[6]	---------	50,113	--------- ---------	7 53,353	Silver. Brick, chromite, mineral water, natural gas, quicksilver, sodium sulphate.

† Flasks of 76½ pounds previous to June, 1904; of 75 pounds thence, through 1927; of 76 pounds since January, 1928.

MINERAL PRODUCTION OF

Year	Bituminous rock		Brick		Chromite		Gold, value	Mineral water	
	Tons	Value	M	Value	Tons*	Value		Gallons	Value
1926					[6]			[6]	
1927									
1928					[6]		$725	[6]	
1929				$31,320	[6]		1,267	[6]	
1930			[6]		[6]		1,461	[6]	
1931			[6]				1,549	[6]	
1932							1,021	[6]	
1933			[6]		[6]		759	[6]	
1934			[6]		[6]		1,946	[6]	
1935			[6]		[6]		287	[6]	
1936			[6]		[6]		[6]	[6]	
1937			[6]				9,625	[6]	
1938			[6]				[6]	[6]	
1939							490	[6]	
1940			[6]				350	[6]	
1941			[6]		[6]		315		
1942			[6]		[6]		140	[6]	
1943			[6]		[6]			[6]	
Totals	[6]157,497	$638,882	[6]	$245,792	[6]51,653	$1,129,430	[6]$74,829	[6]76,200	$18,741

Grand total value, $13,780,988.

[7] Includes chromite, granite (tuff), marble, mineral water, petroleum, volcanic ash.
[8] Includes brick and building tile, chromite, clay (pottery), granite (tuff), marble, mineral water, petroleum, volcanic ash.
[9] Includes brick and building tile, granite (tuff), mineral water, volcanic ash, sandstone.
[10] Includes brick, chromite, mineral water, petroleum, volcanic ash, miscellaneous stone.
[11] Includes brick, granite (tuff), mineral water, volcanic ash, chromite, petroleum, sandstone.
[12] Includes brick and hollow building tile, chromite, clay (pottery and oil-well drilling), limestone, mineral water, petroleum, volcanic ash, sandstone.
[13] Includes brick and hollow tile, chromite, clay (pottery and oil-well drilling), gold, limestone, marble, mineral water, petroleum, volcanic ash, sandstone.
[14] Includes brick and building tile, clay (oil-well drilling), limestone, marble, mineral water, petroleum, volcanic ash, sandstone, miscellaneous stone.
[15] Includes brick and hollow tile, clay (oil-well drilling), limestone, mineral water, petroleum, marble, volcanic ash.
[16] Includes brick and hollow tile, clay (oil-well drilling), limestone, mineral water, petroleum, sandstone, volcanic ash.
[17] Includes brick and hollow tile, chromite, limestone, mineral water, petroleum, sandstone, volcanic ash.
[18] Brick and hollow tile, chromite, limestone, manganese ore, marble, mineral water, volcanic ash, petroleum, sandstone.
[19] Brick and hollow tile, chromite, manganese ore, mineral water, petroleum, volcanic ash.

SAN LUIS OBISPO COUNTY, 1876-1943—Continued

Petroleum		Quicksilver		Miscellaneous stone,[5] value	Miscellaneous and unapportioned		
Barrels	Value	Flasks	Value		Amount	Value	Substance
27,982	$22,162	----------	----------	$193,138	------------	$22,914	Clay and clay products.
					------------	15,080	Chromite, mineral water, natural gas, quicksilver.
16,709	12,531	470	$53,600	195,631	------------	33,268	Brick, building tile (hollow), copper, mineral water, pumice.
15,140	12,869	435	48,254	111,181	2 fine oz.	1	Silver.
					------------	44,095	Brick, building tile, chromite, mineral water.
[6]	----------	1,076	120,995	11,061	2 fine oz.	1	Silver.
					------------	26,440	Other minerals.[7]
[6]	----------	1,306	157,440	28,659	3 fine oz.	1	Silver.
					------------	60,554	Other minerals.[8]
53,349	29,342	2,574	202,870	150,016	2 fine oz.	1	Silver.
					------------	16,357	Other minerals.[9]
66,744	36,709	2,035	106,508	105,075	3 fine oz.	1	Silver.
					------------	616	Mineral water, volcanic ash, sandstone.
[6]	----------	285	15,759	[6]	------------	39,396	Other minerals.[10]
[6]	----------	1,302	91,677	11,860	8 fine oz.	5	Silver.
					------------	32,965	Other minerals.[11]
[6]	----------	2,474	167,613	22,236	------------	75,307	Other minerals.[12]
[6]	----------	2,588	196,786	20,916	------------	134,644	Other minerals.[13]
[6]	----------	2,123	179,731	[6]	------------	15	Silver.
					------------	134,320	Other minerals.[14]
[6]	----------	1,114	77,938	19,150	------------	145,412	Other minerals.[13]
[6]	----------	276	26,587	22,407	------------	124,640	Other minerals.[16]
[6]	----------	1,470	243,832	70,231	------------	176,916	Other minerals.[16]
[6]	----------	1,844	325,088	169,442	------------	77,180	Other minerals.[17]
[6]	----------	2,782	518,657	212,255	------------	300,062	Other minerals.[18]
[6]	----------	2,625	478,442	77,412	------------	481,008	Other minerals.[19]
675,687	$569,868	75,087	$5,180,162	[6]$2,410,418	------------	$3,512,866	

MINERAL PRODUCTION OF

Year	Salt		Brick	
	Tons	Value	M	Value
1895				
1896				
1897				
1898			1,140	$7,00
1899			2,870	24,22
1900			225	9,00
1901	40	$400	500	9,07
1902	6,500	16,000	200	8,00
1903	7,700	25,000	3,100	77,50
1904	12,000	62,500	3,902	56,43
1905	16,000	67,500	5,902	61,43
1906	14,900	44,920	6,613	67,00
1907	14,000	56,000	8,078	86,28
1908	23,800	60,900	4,494	63,23
1909	22,100	95,400	1,346	38,40
1910	26,000	64,750	1,350	37,25
1911	27,500	55,000	1,350	43,00
1912	33,000	80,000	1,400	40,50
1913	28,000	72,250	1,418	44,68
1914	27,500	76,750	950	24,07
1915	25,500	63,750	715	19,55
1916	28,540	70,807	986	38,12
1917	36,483	114,689		
1918	26,434	144,604		
1919	30,238	136,190		
1920	37,409	206,897		
1921	32,587	167,022	[3]	
1922	32,428	149,302		
1923	35,757	199,192		
1924	54,258	205,176		
1925	31,325	155,925		
1926		[3]		
1927		[3]		
1928	[3]			
1929	[3]			
1930	[3]			
1931	[3]			
1932	[3]			
1933	[3]			
1934	[3]			
1935	[3]			
1936	[3]			
1937	[3]			
1938	[3]			
1939	[3]			
1940	[3]			
1941	[3]			
1942				
1943				
Totals	630,089	$2,360,924	[3]46,539	$754,7

Grand total value, $50,964,995.

[1] The limestone produced in San Mateo County is used as crushed rock and is included under Stone Industr Previous to 1915 it was erroneously classified as industrial limestone and tabulated under that heading.
[2] Includes crushed rock, rubble, sand, gravel.
[3] See under 'Unapportioned.'
[4] Includes shells dredged from San Francisco Bay.

SAN MATEO COUNTY, 1895-1943

Limestone		Miscellaneous stone[2], value	Miscellaneous and unapportioned		
Tons	Value		Amount	Value	Substance
-----	-----	-----	5,000 tons	$5,000	Clay.
-----	-----	-----	1,000 bbls. 500 bbls.	1,250 1,250	Petroleum. Cement.
-----	-----	$40,000	-----	-----	
-----	-----	70,000	-----	-----	
-----	-----	34,000	-----	-----	
-----	-----	7,500	-----	-----	
-----	-----	6,000	17 tons	255	Asphalt.
-----	-----	301,120	5,000 tons	5,625	Clay.
-----	-----	150,000	-----	-----	
-----	-----	113,866	3,000 bbls.	6,000	Petroleum.
-----	-----	75,000	-----	-----	
-----	-----	111,823	-----	-----	
-----	-----	2,111	-----	-----	
37,687	$17,451	89,142	-----	-----	
120,306	96,245	90,221	-----	500	Gems.
111,382	89,106	88,766	-----	-----	
93,500	74,800	61,185	-----	-----	
102,300	66,495	29,587	-----	-----	
138,544	78,506	18,635	-----	300	Gems.
153,329	75,941	34,648	81,000 tons 6,581 bbls. -----	34,120 845 200	Sandstone. Lime. Gems.
[1]	-----	93,391	----- -----	100 1,100	Gems. Other minerals.
-----	-----	25,663	593 tons -----	732 85	Pottery clay. Gems.
-----	-----	71,668	----- -----	150 20,656	Gems. Brick and tile, magnesium chloride, potash
-----	-----	34,164	-----	15,044	Magnesium chloride, potash.
-----	-----	42,235	-----	63,246	Other minerals.
-----	-----	46,040	322 bbls. -----	966 39,200	Petroleum. Magnesium salts, potash.
-----	-----	61,697	322 bbls. -----	966 27,407	Petroleum. Brick, magnesium chloride, potash.
-----	-----	60,009	-----	34,984	Magnesium salts, petroleum, potash.
-----	-----	96,815	-----	33,809	Magnesium chloride, petroleum, potash.
-----	-----	75,078	-----	21,917	Gems, magnesium chloride, petroleum potash.
-----	-----	90,757	-----	1,330,831	Cement, gems, magnesium chloride, natural gas, petroleum, potash.
-----	-----	77,470	-----	1,816,383	Cement, magnesium chloride, natural gas, petroleum, salt.
[3]	-----	129,802	-----	1,734,036	Cement, limestone, natural gas, petroleum, salt.
[3]	-----	251,602	-----	3,076,971	Cement, limestone[4], magnesium carbonate, natural gas, petroleum, salt.
[3]	-----	278,839	-----	3,393,940	Cement, limestone[4], magnesium carbonate, natural gas, salt.
[3]	-----	340,490	-----	2,159,447	Cement, limestone[4], magnesium carbonate, natural gas, salt.
[3]	-----	219,715	-----	2,010,794	Cement, limestone[4], magnesium carbonate, natural gas, salt.
[3]	-----	169,689	-----	1,173,761	Cement, limestone[4], magnesium carbonate, natural gas, salt.
[3]	-----	75,752	-----	1,493,728	Cement, limestone[4], magnesium carbonate, natural gas, petroleum, salt.
[3]	-----	24,000	-----	1,538,490	Cement, limestone[4], magnesium carbonate, natural gas, petroleum, salt.
[3]	-----	98,488	-----	1,491,671	Cement, limestone[4], magnesium carbonate, salt.
[3]	-----	101,845	-----	2,308,962	Cement, limestone[4], magnesium carbonate, salt.
[3]	-----	85,680	-----	2,225,104	Cement, limestone[4], magnesium carbonate, salt.
[3]	-----	[3]	-----	2,026,217	Cement, limestone[4], magnesium carbonate, salt, miscellaneous stone.
[3]	-----	65,392	-----	2,353,503	Cement, limestone[4], magnesium carbonate, salt, petroleum.
[3]	-----	76,497	-----	2,544,114	Cement, limestone[4], magnesium carbonate, petroleum, salt.
[3]	-----	120,541	-----	3,305,972	Cement, limestone[4], magnesium carbonate, petroleum.
[3]	-----	109,901	-----	3,764,595	Cement, limestone[4], magnesium salts.
[3]	-----	165,363	-----	2,876,071	Cement, limestone[4], magnesium salts.
[4]757,048	$498,544	[3]$4,411,467	-----	$42,939,297	

MINERAL PRODUCTION OF

Year	Lime		Limestone	
	Barrels	Value	Tons	Value
1894	167,000	$138,200	4,000	$5,000
1895	145,000	133,750	12,055	12,055
1896	116,000	95,500	27,827	28,663
1897	149,600	111,800	10,688	8,005
1898	151,000	151,000	7,912	5,738
1899	161,893	176,893	4,135	3,730
1900	163,985	131,288	1,669	1,213
1901	161,500	161,500	3,845	3,595
1902	185,223	161,302	1,850	1,850
1903	220,835	185,442	3,000	2,725
1904	293,207	306,775	[2]	----------
1905	218,084	199,974	7,325	52,125
1906	255,469	347,490	11,431	55,242
1907	213,599	241,179	6,370	6,000
1908	119,996	119,996	1,178	2,167
1909	228,875	296,785	3,457	5,273
1910	214,137	230,513	4,361	6,770
1911	216,508	206,225	22,622	44,591
1912	169,646	159,505	7,307	7,553
1913	75,000	60,000	39,494	30,994
1914	173,282	157,011	14,666	25,082
1915	191,643	177,873	2,047	4,873
1916	176,263	225,485	4,318	9,820
1917	213,104	173,778	6,527	11,378
1918	182,083	285,316	7,132	15,313
1919	150,271	234,039	5,527	12,690
1920	141,633	202,908	5,062	20,101
1921	122,907	242,869	[2]	----------
1922	174,490	235,802	4,581	20,534
1923	157,660	203,632	6,733	14,242
1924	127,830	212,540	[2]	----------
1925	165,340	224,724	16,551	33,102
1926	154,570	227,904	----------	----------
1927	134,310	173,207	16,717	38,045
1928	121,290	135,991	8,600	24,849
1929	100,750	112,761	15,143	40,786
1930	[2]	----------	11,405	46,925
1931	[2]	----------	9,383	34,430
1932		----------	6,330	15,292
1933	[2]	----------	6,413	22,587
1934	[2]	----------	[2]	----------
1935	[2]	----------	[2]	----------
1936	[2]	----------	[2]	----------
1937	[2]	----------	13,043	45,754
1938	[2]	----------	[2]	----------
1939	[2]	----------	34,873	47,529
1940	[2]	----------	30,807	73,875
1941	[2]	----------	19,937	96,978
1942	[2]	----------	[2]	----------
1943	----------	----------	24,372	156,703
Totals	[2]6,113,983	$6,606,998	[2]670,693	$1,291,416

Grand total value, $94,310,635.

[1] Includes crushed rock, rubble, sand, gravel.
[2] See under 'Unapportioned.'

SANTA CRUZ COUNTY, 1894-1943

Bituminous rock		Miscellaneous stone[1], value	Miscellaneous and unapportioned		
Tons	Value		Amount	Value	Substance
20,782	$79,980	----	----	----	
32,067	102,486	$4,000	75 M	$375	Brick.
43,843	109,536	4,000	497 M	2,485	Brick.
43,179	123,056	----	300 M	1,500	Brick.
40,598	113,898	----	----	----	
27,503	70,569	200	----	----	
21,960	58,590	----	----	----	
13,580	30,654	----	10 tons	30	Clay.
31,700	41,084	----	106 tons	1,060	Asphalt.
18,426	45,190	20,750	700 cu. ft.	140	Granite.
[2]	----	2,925	----	----	
17,583	42,500	1,750	----	----	
13,544	38,860	3,500	----	----	
21,955	64,707	14,800	----	----	
25,041	85,123	19,736	450 cu. ft.	336	Granite.
			28,400 tons	28,400	Clay.
31,392	110,067	20,717	63,541 tons	13,800	Clay.
			----	1,794,294	Unapportioned, 1900-1909.
35,565	124,195	23,425	52,970 tons	15,981	Clay.
			----	2,096,031	Unapportioned.
24,815	80,371	7,627	----	2,448,339	Unapportioned.
32,146	80,439	22,710	----	879,437	Other minerals.
26,932	67,330	10,511	----	1,647,970	Unapportioned.
40,540	115,500	4,276	----	1,341,089	Unapportioned.
17,399	60,728	6,794	----	1,331,263	Unapportioned.
[2]	----	2,815	----	1,440,991	Cement, marble bituminous rock.
[2]	----	2,368	----	1,480,800	Cement, potash, bituminous rock.
[2]	----	9,107	----	2,599,717	Cement, potash, bituminous rock.
[2]	----	17,074	----	1,981,253	Other minerals.
[2]	----	23,379	----	2,834,750	Bituminous rock, cement, iron ore, mineral paint, potash.
[2]	----	22,895	----	3,815,121	Bituminous rock, cement, limestone, mineral paint, potash.
[2]	----	7,398	----	3,345,071	Cement, bituminous rock, potash.
[2]	----	15,363	----	3,992,668	Cement, bituminous rock, potash.
[2]	----	29,217	----	4,097,476	Cement, bituminous rock, potash, limestone.
[2]	----	21,125	----	2,948,085	Bituminous rock, cement.
			----	143	Gold.
[2]	----	26,361	----	1	Silver.
			----	3,249,785	Bituminous rock, cement, limestone.
[2]	----	45,570	----	3,216,387	Bituminous rock, cement.
----	----	62,571	----	3,100,509	Bituminous rock and cement.
----	----	75,250	----	3,098,836	Bituminous rock and cement.
----	----	79,218	----	2,235,811	Bituminous rock, cement, iron ore, lime.
----	----	98,881	----	1,633,823	Bituminous rock, cement, coal, lime.
----	----	34,253	----	998,221	Bituminous rock, cement, lime.
----	----	14,120	----	307	Gold.
			3 oz.	1	Silver.
				1,197,165	Bituminous rock, cement, lime.
----	----	84,744	----	130	Gold.
			2 oz.	1	Silver.
			----	1,711,969	Bituminous rock, cement, coal, iron ore, lime, limestone.
			----	617	Gold.
[2]	----	78,743	----	6	Silver.
			----	1,454,067	Bituminous rock, cement, lime, limestone, marble.
[2]	----	128,407	----	1,974,715	Bituminous rock, cement, gold, lime, limestone, silver.
[2]	----	[2]	----	2,028,709	Bituminous rock, cement, lime, miscellaneous stone.
			----	350	Gold.
[2]	----	91,422	----	1	Silver.
			----	1,815,415	Bituminous rock, cement, iron ore, lime, limestone.
[2]	----	305,417	----	70	Gold.
			----	2,787,726	Bituminous rock, cement, iron ore, lime.
			----	665	Gold.
[2]	----	141,602	----	4	Silver.
			----	2,563,160	Bituminous rock, cement, iron ore, lime.
			----	315	Gold.
[2]	----	173,728	----	2	Silver.
			----	2,989,805	Bituminous rock, cement, iron ore, lime.
[2]	----	162,588	----	3,344,384	Bituminous rock, cement, limestone.
[2]	----	[2]	----	2,744,049	Bituminous rock, cement, iron ore, miscellaneous stone.
[2]580,550	[2]$2,225,363	[2]$1,901,337	----	$82,285,521	

MINERAL PRODUCTION OF SIERRA COUNTY, 1880-1943

Year	Gold, value	Silver, value	Miscellaneous stone[1], value	Miscellaneous and unapportioned		
				Amount	Value	Substance
1880	$974,332	$576				
1881	950,000	6,000				
1882	1,100,000					
1883	1,075,000					
1884	1,177,349	145				
1885	1,433,881	11				
1886	1,967,152	2,414				
1887	1,502,469	202				
1888	1,250,000	1,500				
1889	1,446,486	1,222				
1890	733,528	2,039				
1891	701,702	811				
1892	688,464	26				
1893	839,343	46				
1894	604,722					
1895	694,470	107				
1896	786,175	424				
1897	370,208	46				
1898	399,063	519				
1899	450,115	359				
1900	659,696	3,463				
1901	575,427	755				
1902	326,155	311		24,000 gals.	$6,000	Mineral water.
1903	310,770	476				
1904	374,763	1,222				
1905	517,303	3,687				
1906	409,366	2,518				
1907	483,904	2,621		120,000 gals.	12,000	Mineral water.
1908	412,626	1,917				
1909	189,672	957				
1910	312,035	1,330				
1911	461,513	5,604				
1912	732,988	2,777		1,285 lbs.	212	Copper.
				9,919 lbs.	446	Lead.
1913	1,006,573	4,305		2,228 lbs.	98	Lead.
1914	730,000	3,000				
1915	726,362	3,156				
1916	724,256	3,291			1,950	Other minerals.
1917	384,428	1,629		13,031 lbs.	3,558	Copper.
1918	289,368	2,121		807 tons	40,012	Chromite.
1919	301,172	2,957	$750			
1920	442,894	3,967				
1921	612,267	5,236	2,858			
1922	1,753,242	14,484	2,900			
1923	878,164	6,134	2,312			
1924	799,276	5,198	8,000		2	Other minerals.
1925	1,373,705	8,919	3,677			
1926	564,452	2,913	2,150			
1927	678,873	3,350	70,300		10	Other minerals.
1928	674,855	3,614	1,433		24	Unapportioned.
1929	367,396	1,783	21,223			
1930	589,249	1,056	15,265		15	Unapportioned.
1931	651,754	1,661	37,500			
1932	590,294	2,268	12,965	5,395 lbs.	340	Copper.
				69,490 lbs.	2,005	Lead.
1933	445,102	1,173	2,833	599 lbs.	38	Copper.
1934	1,027,582	4,546	14,040	757 lbs.	61	Copper.
				2,104 lbs.	78	Lead.
1935	841,218	3,257	16,069	1,612 lbs.	134	Copper.
				964 lbs.	38	Lead.
1936	770,945	3,464	[2]		13,225	Copper, lead, miscellaneous stone.
1937	934,570	3,869	36,092	1,213 lbs.	146	Copper.
					3	Other minerals.
1938	900,480	3,109	[2]	17,608 lbs.	810	Lead.
					838	Copper and miscellaneous stone.
1939	864,430	3,177	3,366	4,752 lbs.	223	Lead.
					16	Other minerals.
1940	958,685	2,854	7,630	1,367 lbs.	154	Copper.
1941	957,670	3,217	[2]	1,872 lbs.	221	Copper.
				10,502 lbs.	599	Lead.
					2,640	Chromite and miscellaneous stone.
1942	631,050	1,871	[2]		7,974	Chromite, miscellaneous stone.
1943	163,415	583	[2]		12,018	Chromite, platinum, miscellaneous stone.
Totals	$52,814,732	$175,977	[2]$281,048		$175,197	

Grand total value, $52,446,695.

[1] Includes crushed rock, macadam, ballast, rubble, rip-rap, sand, gravel.
[2] See under 'Unapportioned.'

Santa Barbara County

Year	Petroleum		Natural gas		Asphalt bituminous rock		Mineral water		Diatomaceous earth		Brick		Limestone		Sandstone		Miscellaneous stone[1], value	Miscellaneous and unapportioned		
	Barrels	Value	M cubic feet	Value	Tons	Value	Gallons	Value	Tons	Value	M	Value	Tons	Value	Cubic feet	Value		Amount	Value	Substance
1881																			$2,000	Gold.
1882																				
1889																			41,423	Gold.
1890																			10,293	Gold.
1891																			2,478	Gold.
1892																			898	Gold.
1893																				
1894	1,800	$1,800			4,550	$91,000														
1895	16,904	12,678			23,950	139,000	22,500	$3,000											4,000	Gold.
1896	39,792	35,813			18,430	317,910	31,500	20,300							5,000	$500		12 ozs.	44 8,592	Platinum. Gold.
1897	130,136	130,136	[3]500	$246	18,047	318,000	85,000	30,000											3,000	Gold.
1898	132,217	112,549	[3]165	135	19,735	351,400	15,000	7,000			100	$700							1,000	Gold.
1899	208,370	191,228	160	120	6,058	121,160	15,000	5,000			120	960								
1900	183,486	165,138	1,203	2,966	5,270	105,500	19,000	10,350			4,620	40,960	7,205	$3,602	224,820	117,260	$82,662			
1901	203,616	113,385	[3]876	438	4,145	55,800	113,780	60,200			1,250	9,825			72,000	27,100	33,400			
1902	230,440	181,313	937	375	1,259	12,590	105,280	60,200	362	$2,172	1,400	12,200	10,000	25,000	74,200	21,500			200	Gold.
1903	262,226	149,640	320	320	2,974	41,688	88,800	22,280	2,700	15,925	4,900	46,200	20,000	40,000	82,654	34,240	4,395	30,000 bbls.	30,000	Lime.
1904	790,000	445,560	3,000	1,500	9,000	190,000	118,000	18,249	6,950	112,282	1,120	8,420	8,000	12,000	5,000	3,600				
1905	3,534,000	1,413,600			3,000	30,000	115,250	21,450	3,000	15,000	4,025	34,750	5,000	7,500	29,600	18,330	57,792	52 flasks	2,070 725	Quicksilver. Gold.
1906	4,876,000	1,237,250	1,000	500	25,000	250,000	13,750	10,450	2,300	13,800	200	1,600	8,000	16,000	36,195	25,230	9,732		2 250	Silver. Gold.
1907	8,392,623	4,166,661	600	300	19,192	258,549	39,480	24,250	2,531	28,948	1,615	14,650	15,000	30,000	39,740	37,566	4,950	60 flasks	2,289	Quicksilver.
1908	8,847,589	4,423,794	715,612	357,806	7,000	70,000	5,500	4,932	2,950	32,012	750	7,500	16,580	33,160	10,525	6,545	10,930			
1909	8,116,788	4,069,661	768,000	394,621	200	2,488	155,400	22,200			990	9,180	4,849	6,619	31,120	10,648	5,316		89,254	Unapportioned, 1900-1909.
1910	7,682,555	3,856,222	9,198,000	1,393,250			155,000	21,500	1,343	14,117	1,900	16,825	4,028	7,898	39,720	15,888	6,035	70 flasks	3,225	Quicksilver.
1911	6,766,156	3,204,717	[3]1,003,860	100,386			73,640	15,900	1,344	13,720	1,600	13,800	4,239	8,174	58,978	29,507	6,602	50 flasks	2,301	Quicksilver.
1912	6,882,719	3,747,045	[3]3,425,000	253,633	11,120	5,556	105,000	11,550	1,129	13,074	2,615	17,150	5,327	11,666	4,500	1,670	17,480	12,000 tons 17,500 bbls.	16,000 18,434	Clay. Lime.
1913	6,291,076	3,151,725	5,096,300	254,815	10,000	10,000	112,500	108,130	6,895	28,960	3,000	24,000	5,884	19,623	4,500	1,670	11,450	12,000 tons 26,512 bbls.	16,000 25,910	Clay. Lime.
1914	4,325,787	1,989,862	6,313,380	378,802	25,000	50,000	160,400	152,432	②		2,100	16,800	6,157	11,263	9,286	1,850	15,300		70,000	Other minerals.
1915	5,634,534	3,442,700	3,193,368	279,697			189,028	156,175			1,800	14,400	5,956	10,006	29,900	6,488	13,900		61,600	Other minerals.
1916	4,502,206	3,574,752	3,660,140	724,746	②		176,608	110,200	②		②		②		3,520	1,017	12,395		111,919	Bituminous rock, brick, 'granite,' diatomaceoue earth, limestone, quicksilver.
1917	5,631,563	4,550,303	3,104,170	227,507			104,991	86,026	②		②		②		28,700	6,150	5,950	97 tons	126,830 150,315	Potash. Brick, diatomaceous earth, limestone, quicksilver.
1918	7,334,104	9,057,618	4,150,316	338,036	②		73,117	97,162	②		②		3,790	18,830	②		11,613	1,863 tons	256,780 271,792	Potash. Bituminous rock, chromite, brick, diatomaceous earth, quicksilver, sandstone.
1919	6,089,082	6,850,217	4,084,709	336,092	②		82,147	81,041	②		②		②				29,900	298 tons	30,128 267,539	Potash. Bituminous rock, chromite, brick, diatomaceous earth, limestone.
1920	5,803,583	9,140,643	1,359,665	128,126	②		95,843	110,931	②		②				②		27,436	410 tons	40,000 1,091,475	Potash. Bituminous rock, brick, diatomaceous earth, quicksilver, sandstone.
1921	5,465,942	9,122,657	1,544,802	145,179	②		97,847	133,590	②						②		65,600	143 tons	5,720 718,183	Potash. Bituminous rock, diatomaceous earth, sandstone.
1922	3,931,155	3,974,398	1,878,900	167,290	②		110,552	52,269	②		②						72,300		347,101	Bituminous rock, brick, diatomaceous earth, potash, sandstone, shale oil.
1923	3,081,947	2,394,443	1,612,287	172,725	②		81,200	80,300	②						②		14,324		2,344,090	Bituminous rock, diatomaceous earth, sandstone, shale oil.
1924	2,905,181	3,009,768	1,643,355	158,836	②		②		②		②		②		②		75,305		1,915,831	Clay and clay products, bituminous rock, diatomaceous earth, mineral water, shale oil.
1925	2,647,380	2,419,705	2,545,208	248,708			②		②			75,487					106,665	2,390 tons	5,800 1,482,066	Clay (pottery). Diatomaceous earth, mineral water, shale oil.
1926	1,925,204	1,526,587	2,230,501	246,091	②		②		②			17,076					88,575	1,100 tons	1,700 703,519	Clay (pottery). Bituminous rock, diatomaceous earth, mineral water, shale oil.
1927	2,173,887	1,630,415	1,701,715	204,775	②		②		②		②						139,093		725,013	Bituminous rock, brick and hollow building tile, clay (pottery), diatomaceous earth, mineral water, sandstone, shale oil.
1928	3,078,103	3,409,023	1,154,803	158,930	②		2,950	175	②		②		②				270,661		737,650	Barite, bituminous rock, brick and hollow building tile, diatomite, marble.
1929	11,141,789	13,984,055	1,291,786	145,680	②		②		②		②		②				264,745		2,012,656	Barite, bituminous rock, brick and hollow building tile, diatomite, marble, mineral water.
1930	15,014,132	22,343,440	6,274,436	299,918	②		②		②		②	14,980	②				202,955		1,507,081	Barite, bituminous rock, clay (pottery), diatomite, marble, mineral water, quicksilver.
1931	11,660,456	11,121,743	6,634,435	446,885	②		②		②		②		②				67,476	7,135 lbs. 6 ozs.	650 81 2 1,077,923	Copper. Gold. Silver. Barite, bituminous rock, brick and hollow building tile, clay (pottery), diatomite, marble, mineral water, quicksilver.
1932	6,658,649	6,405,620	4,479,831	309,154	②		②		②		②		②				87,045	129 flasks	6,773 774,045	Quicksilver. Barite, bituminous rock, diatomite, marble, mineral water.
1933	6,395,679	5,989,786	3,471,759	184,609	②		②		②				②				38,019	27,998 lbs. 20 ozs.	1,792 27 7 787,533	Copper. Gold. Silver. Bituminous rock, diatomite, marble, minera water, quicksilver.
1934	6,848,120	8,322,148	4,360,533	316,360	②		②		②		②		②				51,602		880,081	Bituminous rock, brick, diatomite, marble, mineral water.
1935	7,649,068	7,068,739	4,596,531	524,998	②		②		②								8,081		1,051,845	Bituminous rock, diatomite, mineral water.
1936	7,149,077	8,174,953	4,582,891	319,877	②		②		②		②						80,165		1,118,344	Bituminous rock, brick, diatomite, marble, quicksilver, mineral water.
1937	8,273,815	8,961,642	5,557,621	328,572	②		②		②		②		②				②	634 flasks	51,140 1,367,702	Quicksilver. Bituminous rock, brick, chromite, diatomite, marble, mineral water, miscellaneous stone.
1938	9,555,732	9,309,262	4,655,732	327,466	②		②		②		②						②	104 flasks	7,179 1,039,815	Quicksilver. Bituminous rock, brick, pottery clay, diatomite, granite, marble, mineral water, miscellaneous stone.
1939	8,944,217	7,423,000	4,694,932	307,732	②				②		②						70,326	74 flasks	6,876 1,103,072	Quicksilver. Bituminous rock, brick, pottery clay, diatomite, marble.
1940	10,270,200	6,354,757	4,726,148	305,203	②		②		②		②						102,476	7,765 lbs. 500 flasks	877 35 81,223 5 1,189,775	Copper. Gold. Quicksilver. Silver. Bituminous rock, brick, diatomite, marble, mineral water.
1941	11,963,579	7,705,929	5,602,417	346,010	②		②		②		②						199,159		1,771,361	Bituminous rock, pottery clay, diatomite, marble, mineral water, quicksilver.
1942	13,267,311	6,407,096	2,663,010	224,275	②				②		②						155,360		1,628,314	Bituminous rock, brick, clay (pottery), copper, diatomite, gold, quicksilver, silver.
1943	16,285,344	13,523,627	4,052,577	298,960	②		②		②		②						310,640		2,697,598	Bituminous rock, brick, diatomite, mineral water, quicksilver.
Totals	279,795,316	$241,008,563	128,315,371	$11,382,850	[3]213,930	$2,420,641	[3]2,544,081	$31,679	[3]31,504	$290,010		$398,463	[3]128,015	$261,341	[3]789,956	$366,759	$2,857,810		$31,907,252	

Grand total value, $290,886,188.

1 Includes crushed rock, rubble, rip-rap, sand, gravel.
② See under 'Unapportioned.'
3 Quantity estimated, as only value originally reported.

MINERAL PRODUCTION OF SANTA CLARA COUNTY, 1850-1943

Year	Quicksilver Flasks	Quicksilver Value	Mineral water Gallons	Mineral water Value	Petroleum Barrels	Petroleum Value	Brick M	Brick Value	Pottery clay Tons	Pottery clay Value	Sandstone Cubic feet	Sandstone Value	Limestone Tons	Limestone Value	Miscellaneous stone[1], value	Magnesite Tons	Magnesite Value	Miscellaneous and unapportioned Amount	Miscellaneous and unapportioned Value	Substance
1850	7,723	$768,052																		
1851	27,779	1,859,248																		
1852	15,901	927,505																		
1853	22,284	1,233,648																		
1854	30,004	1,663,722																		
1855	29,142	1,560,554																		
1856	27,138	1,401,678																		
1857	28,204	1,374,381																		
1858	25,761	1,232,149																		
1859	1,294	81,690																		
1860	7,061	378,117																		
1861	34,429	1,447,739																		
1862	39,671	1,442,041																		
1863	32,803	1,380,350																		
1864	42,489	1,950,245																		
1865	47,194	2,166,205																		
1866	35,150	1,867,519																		
1867	24,461	1,122,760																		
1868	25,628	1,176,325																		
1869	16,898	775,618																		
1870	14,423	827,592																		
1871	18,568	1,171,641																		
1872	18,574	1,224,584																		
1873	11,042	887,004																		
1874	9,084	995,455																		
[3]	20,000	1,098,000																		
1875	16,980	1,428,867																		
1876	27,930	1,228,920																		
1877	30,237	1,127,840																		
1878	24,924	820,000																		
1879	36,054	1,076,212																		
1880	30,135	934,185																		
1881	31,288	933,321																		
1882	29,208	824,542																		
1883	29,084	836,165																		
1884	20,000	610,000																		
1885	21,400	658,050																		
1886	18,000	639,000																		
1887	20,000	847,600																		
1888	18,000	765,000																		
1889	13,100	580,500																		
1890	12,600	630,000																		
1891	8,200	371,105																		
1892	5,563	226,470																80,000 cu. ft.	$4,072	Natural gas.
1893	6,614	243,064																		
1894	7,235	222,169	6,000	$1,250	3,500	$8,500	22,725	$119,250			24,000	$8,292						800,000 cu. ft.	12,000	Natural gas.
1895	7,050	253,800	20,000	5,000	4,000	10,000	24,750	131,250							$33,900					
1896	6,222	211,570	44,000	18,800	900	1,145	15,000	80,000					500	$600	5,000				1,300	Natural gas.
1897	4,700	169,200	39,500	17,600	4,600	10,000	19,000	105,000												
1898	5,875	235,000	25,863	11,358	3,000	6,000	13,096	65,490	200	$2,500					12,000			32 tons	640	Asphalt.
1899	4,435	186,270	79,000	18,150	1,500	3,000	30,741	170,455					1,800	3,000	8,000	100	$1,350	5 tons	75	Manganese.
1900	5,145	241,073	30,000	8,060			20,000	136,000	2,000	6,000	120,000	100,000	8,000	6,000		39	253			
1901	5,220	236,608	55,000	8,500			21,800	94,570			60,000	80,000			917	50	300	17 tons	255	Asphalt.
1902	5,869	254,260	21,900	5,500			23,982	178,662			35,000	31,500						2,000 cu. ft.	1,200	Granite.
1903	5,603	233,130	50,000	12,500	4,695	3,968	28,066	188,284			112,350	225,000	7,000	7,000	100			21 tons 11 tons	47 132	Bituminous rock. Asphalt.
1904	[4]3,889	146,103	50,000	12,500	42,000	13,860	24,906	178,581							12,000					
1905	2,693	95,968	5,000	1,200	41,000	14,555	28,466	204,357	700	1,050	100,000	150,000	10,000		3,000					
1906	2,592	94,808	5,000	1,250	7,000	2,800	23,397	183,676	1,000	1,500			9,460	15,000						
1907	2,518	96,086	11,374	2,167	22,100	5,525	30,053	255,424			3,500	3,500	671	16,694		[4]3,700	33,300			
1908	2,460	103,964	371,635	39,955	35,400	17,700	15,000	63,618					2,221	1,417	45,142	[4]2,000	24,000	10,017 bbls.	10,017	Lime.
1909	3,747	158,490	373,367	40,754	63,780	70,536	6,000	30,000					4,284	4,150	75,916	300	3,000	1,000 bbls.	1,000 82,254	Lime. Unapportioned, 1900-1909.
1910	4,038	182,719	182,500	11,200	36,660	36,660	12,000	66,000	12,000	66,000			2,417	3,451	68,765	7,560	51,937			
1911	7,533	346,593	165,720	10,000	12,528	8,505	6,000	30,000					3,374	3,918	62,595					
1912	8,695	365,538	152,500	10,250	14,092	8,295	18,000	105,000					3,549	4,120	48,228	600	6,000	13,508 bbls.	10,154	Lime.
1913	3,709	149,213	101,000	10,750	20,000	12,000	18,000	95,000						4,200	29,377	70	660	13,107 bbls. 2,000 cu. ft.	9,783 500	Lime. Natural gas.
1914	2,407	118,063	29,000	10,750	10,000	5,300	15,900	79,500							39,093	1,425	14,250			
1915	4,386	376,319	38,400	16,770	16,617	11,067	10,096	57,764					(2)		68,342	7,623	74,007		340	Other minerals.
1916	4,016	375,496	50,000	11,300	16,368	10,901	13,100	82,800	2,024	2,293			(2)		111,974	23,207	232,156		25,028	Chromite, limestone, manganese.
1917	5,921	639,594	10,230	1,923	18,855	26,152	14,000	80,000	6,014	4,929					111,304	9,963	99,287		28,341	Chromite, manganese, tile, limestone.
1918	3,977	478,524	13,025	1,678	20,499	34,848	6,792	82,000					(2)		111,860	9,746	121,872		948,756	Chromite, manganese, clay, tile, potash.
1919	3,012	271,762	(2)		16,724	26,695	7,250	65,000	2,532	2,232			(2)		73,237	10,912	128,024		480,721	Manganese, limestone, mineral water, potash.
1920	2,893	233,199	3,360	480	18,095	23,901	11,890	164,680	1,900	4,600					129,582	26,612	392,580		89,670	Limestone and potash.
1921	(2)		2,500	275	13,964	26,943	7,601	110,961	1,128	2,300			(2)		138,584	25,900	280,000		191,645	Limestone marl, potash, quicksilver.
1922	(2)		3,500	325	(2)		11,409	150,057	3,836	7,372			8,252		235,125	28,650	301,875		199,282	Limestone (marl), petroleum, quicksilver.
1923	(2)		(2)		(2)		22,514	282,997	2,202	3,954			also marble	49,512	314,835	36,390	472,620		196,375	Mineral water, natural gas, petroleum, quicksilver.
1924	(2)		(2)		14,417	20,481	24,271	217,172	5,341	6,666			(2)		259,023	(2)			648,050	Limestone, magnesite, mineral water, natural gas, quicksilver.
1925	(2)		(2)		13,828	22,594	24,250	251,059	1,616	3,216			(2)		453,273	(2)			590,718	Limestone, magnesite, mineral water, natural gas, quicksilver.
1926	(2)		(2)		(2)				(2)						478,231	(2)			197,998 352,277	Clay and clay products. Magnesite, mineral water, natural gas, quicksilver, petroleum.
1927			(2)		11,994	14,212	20,254	199,472	4,373	4,261					457,703	(2)			315,228	Magnesite and mineral water.
1928	(2)		(2)		13,746	15,121	14,822	157,732	3,058	2,063			(2)		467,555	(2)			379,070	Limestone, magnesite, mineral water, quicksilver.
1929	(2)		10,760	1,076	(2)		14,063	168,872	13,671	13,871			(2)		332,902	(2)			440,757	Limestone, magnesite, natural gas, petroleum, quicksilver, salt.
1930	(2)		(2)		(2)		11,592	113,150	3,607	2,259			(2)		406,718	(2)			359,202	Limestone, magnesite, mineral water, natural gas, petroleum, quicksilver.
1931	(2)		(2)		(2)			82,127	2,666	1,826					403,453	(2)			178,694	Limestone, magnesite, mineral water, natural gas, petroleum, quicksilver.
1932	123	6,459	(2)		12,945	7,125	2,858	25,281	(2)				17,250	53,690	220,482	(2)			8,500	Magnesite, pottery clay, mineral water.
1933	(2)				(2)		6,396	46,384	(2)				30,646	71,557	361,635	(2)			54,635	Magnesite, pottery clay, petroleum, quicksilver.
1934	39	2,813			(2)			54,154	701	442			26,800	84,033	190,958	(2)			54,045	Magnesite, natural gas, petroleum.
1935	81	5,474			(2)		3,686	44,541	2,778	2,263			30,613	71,381	112,043	(2)			76,974	Gems (jasper), magnesite, natural gas, petroleum.
1936	166	11,681			(2)		(2)		1,714	2,590			(2)		318,475	(2)			342,542	Brick, gems, gold, limestone (shells), magnesite, petroleum, silver.
1937	(2)				(2)		22,658	219,087	3,182	5,560			39,379	74,041	262,916	(2)			161,298 35	Gems, magnesite, petroleum, quicksilver. Gold.
1938	283	19,887			(2)		23,270	236,295	(2)				98,944	128,793	213,036	(2)			1 25,828	Silver. Pottery clay, gems, magnesite, petroleum.
1939	252	26,008			(2)		(2)		(2)				69,151	117,763	203,978	(2)			368,507	Brick, pottery, clay, magnesite, petroleum.
1940	1,034	170,837			(2)		(2)						190,753	227,340	235,720				2,595,155	Brick, cement, gems, lime, magnesite, petroleum.
1941	2,644	495,289			(2)		(2)		(2)				280,125	319,558	292,843	(2)			4,832,078	Brick, cement, pottery clay, gems, magnesite, petroleum.
1942	2,333	436,384			(2)		(2)		(2)				(2)		283,789	(2)			8,484,044	Brick, cement, clay (pottery), limestone (shells), magnesite, manganese ore, petroleum.
1943	1,736	322,871			(2)		(2)		(2)				[6]161,003	268,502	381,910	(2)			7,164,667	Brick, cement, clay (pottery), magnesite, manganese ore, petroleum.
Totals	1,159,687	$55,779,695	[1]1,949,134	$292,391	[2]512,507	$484,387		[2]$5,431,722	[2]75,864	$148,747	454,850	$596,292	[2]994,201	$1,525,720	$8,108,219	183,837	$2,109,967		$29,012,046	

Grand total value, $104,391,786.

1 Includes crushed rock, rubble, sand, gravel.
(2) See under 'Unapportioned.'
3 Estimated production of Guadalupe Mine previous to 1875.
4 Erroneously credited to Alameda County in reports of those years
5 Flasks of 76½ pounds previous to June, 1904; of 75 pounds thence, through 1927; of 76 pounds since January, 1928.
6 In part shells.

Year	Brick		Chromite		Copper		Gold, value	Lime		Limestone		Mineral water		Pyrites		Silver, value	Miscellaneous stone[3], value	Miscellaneous and unapportioned		
	M	Value	Tons	Value	Pounds	Value		Barrels	Value	Tons	Value	Gallons	Value	Tons	Value			Amount	Value	Substance
1880							$140,455									$117,907				
1881							350,000									85,000				
1882							300,000									80,000				
1883							210,000									20,000				
1884							320,000									30,000				
1885							417,004									9,223				
1886							699,508									10,647				
1887							627,681									40,204				
1888							600,000									50,000				
1889							415,631									5,396				
1890							420,530									7,279				
1891							554,063									7,432				
1892							574,833									7,977				
1893							500,407									8,577				
1894			1,200	$16,800			617,436					150,000	$75,000			5,032		200 tons	$1,500	Iron ore.
1895			90	1,120			718,696									28,417				
1896	300	$1,500			1,847,087	$184,708	599,209	2,310	$2,541							24,233	$1,400			
1897	1,200	7,200			13,592,610	1,535,966	569,071	2,100	2,100	9,000	$13,500					96,869				
1898	1,200	7,200			21,422,000	2,465,830	860,180	2,500	3,750			3,000	2,000			171,768				
1899	2,000	14,000			21,835,863	3,565,023	873,719	8,000	10,000	250	375	5,000	1,850			196,213	375	100 sq'rs	800	Slate.
1900	2,000	12,000	140	1,400	25,736,473	4,166,735	733,467	17,850	17,850	1,150	1,150	6,640	5,784			635,640				
1901	3,000	12,000	130	1,950	30,990,781	4,881,048	927,975	21,600	12,960			20,295	7,644			891,994	2,000			
1902	2,450	12,250	315	4,275	21,515,887	2,496,731	878,706	18,500	12,500	3,500	3,600	26,295	7,645	3,202	$7,005	306,887				
1903	3,500	17,500	150	2,250	16,453,409	2,171,497	771,242	27,000	10,800	5,400	5,400	40,000	12,000	2,500	5,500	203,991	1,500			
1904	3,000	15,000	98	1,470	26,438,145	3,439,974	1,031,429	18,000	10,500							399,660			47,723	Unapportioned, 1900-1909.
1905	3,500	14,000	20	300	10,830,865	1,688,614	684,952	10,700	8,000	3,600	3,600	80,000	12,000			167,548				
1906	4,400	22,000	80	1,200	22,477,304	4,338,121	819,144	12,860	8,040	27,000	32,960			32,689	89,895	434,483				
1907	4,500	33,000	260	5,200	27,844,364	5,568,873	791,997	29,222	31,900	30,761	30,761			65,788	197,364	370,211		400 tons	400	Iron ore.
1908	2,000	12,000	280	5,600	34,878,677	4,642,976	1,131,832	11,818	9,100	80,000	80,000	100,000	20,000	93,677	539,553	517,596	25,000			
1909	3,500	23,500	205	3,517	58,665,447	7,581,115	1,600,489	8,650	8,000	129,560	134,595	100,000	20,000	449,762	1,349,286	735,460	4,688	108 tons	174	Iron ore.
1910	2,425	17,548	680	9,155	44,947,950	5,725,469	1,533,728	16,616	14,114	117,109	117,083	40,000	10,000	31,683	126,692	648,905		579 tons 1,859 lbs.	900 83	Iron ore. Lead.
1911	2,825	20,094	875	13,697	29,539,913	3,692,489	[1]1,059,681	13,271	10,164	67,924	65,253	25,000	6,250	47,885	151,602	386,991		881 lbs.	40	Lead.
1912	1,697	10,195	1,000	8,000	25,249,892	4,166,232	986,803	6,529	3,548	58,022	45,575	23,225	5,646	62,605	174,402	425,382				
1913	360	4,330	280	2,800	27,686,436	4,291,708	1,208,870	8,595	7,030	41,346	35,616	30,000	6,850	72,071	194,409	448,031		47 tons 19,070 lbs.	1,175 839 10,686	Asbestos. Lead. Other minerals.
1914	1,594	10,223	867	4,884	25,122,766	3,341,328	1,101,202	8,557	5,163	36,997	30,026	30,000	6,850	69,438	195,382	346,706	125	1,436 tons 21,565 lbs.	5,128 841	Iron ore. Lead.
1915	1,836	11,550	1,757	17,570	30,828,917	5,395,060	1,120,848	(2)		44,953	40,945	12,000	1,800	(2)		459,566	1,418	180,936 lbs. 8,378,401 lbs.	8,504 1,038,022 253,950	Lead. Zinc. Iron ore, pyrites, lime.
1916	(2)		12,425	181,225	39,437,196	9,701,550	936,885	(2)		(2)				(2)		1,115,471	800	478,560 lbs. 9,484,800 lbs.	33,021 57,303 1,270,963 342,290	Lead. Lime and limestone. Zinc. Asbestos, brick, iron ore, manganese, mineral water, platinum, pyrites, silica.
1917	(2)		3,116	68,479	28,009,990	7,646,727	775,125	(2)		(2)				(2)		520,703	800	8,725 lbs. 14 ozs. 8,281,516 lbs.	750 78,101 1,100 844,715 308,369	Lead. Lime and limestone. Platinum. Zinc. Cadmium, brick, iron ore, mineral water, molybdenum, pyrites, silica.
1918	(2)		1,423	70,214	25,294,590	6,247,764	543,509			45,671	72,410			(2)		420,410	7,000	492,565 lbs. 35 ozs. 3,045,692 lbs.	34,972 2,709 277,158 422,525	Lead. Platinum. Zinc. Cadmium, brick, iron ore, mineral water, molybdenum, pyrites.
1919	(2)				8,673,342	1,613,242	378,283	(2)		(2)		(2)		138,046	497,398	165,802	31,750	 121 fine ozs.	29,100 21,075 40,153	Lime and limestone. Platinum. Barytes, brick, iron ore, lead, mineral water, zinc.
1920	(2)				810,843	149,195	312,901							135,399	475,330	36,563	32,650	64,400 lbs. 158 fine ozs.	5,152 27,004 69,743	Lead. Platinum. Asbestos, brick, iron ore, lime, limestone, zinc.
1921					437,593	56,449	267,681	(2)		(2)				(2)		5,581	31,945	219 fine ozs.	26,817 452,589	Platinum. Asbestos, barytes, iron ore, lead, pyrites, zinc.
1922					1,827,875	246,763	393,034							(2)		26,901	65,525	496 fine ozs.	57,458 723,910	Platinum. Asbestos, barytes, iron ore, lead pyrites, zinc.
1923					3,437,963	505,381	359,487			(2)				(2)		47,706	86,500	328,115 lbs. 299 fine ozs.	22,968 43,326 498,019	Lead. Platinum. Asbestos, barytes, iron ore, lime, limestone, pyrites.
1924					21,109,958	2,765,405	346,622			28,097	36,480			(2)		343,402	587,637	6,815 lbs. 27 fine ozs.	529 3,361 671,228	Lead. Platinum. Asbestos, coal, diatomaceous earth, iron ore, pyrites, zinc.
1925					14,565,967	2,068,367	235,013			24,395	28,480			(2)		208,818	349,617	647,886 lbs. 8 fine ozs. 11,090,430 lbs.	58,366 725 842,873 510,190	Lead. Platinum. Zinc. Chromite, diatomaceous earth, iron ore, pyrite, talc.
1926					5,113,114	715,839	132,906							(2)		110,719	162,355	15,584 lbs. 28 fine ozs. 17,757,000 lbs.	1,247 3,034 1,331,775 428,272	Lead. Platinum. Zinc. Coal, diatomaceous earth, iron ore, limestone, pyrite, talc.
1927					4,524,906	592,763	191,900			(2)				(2)		70,261	134,678	1,780 lbs. 25 fine ozs.	112 2,552 967,822	Lead. Platinum. Diatomaceous earth, limestone, pyrite, talc, zinc.
1928			(2)		3,040,910	439,194	113,194							(2)		39,431	137,034	4,400 lbs.	255 385,683	Lead. Chromite, coal, diatomite, platinum, pyrite.
1929			(2)		6,060,008	1,067,633	89,689							(2)		31,048	247,351		315,475	Asbestos, chromite, diatomite, platinum, pyrite.
1930					3,962,383	615,110	226,214							(2)		5,442	228,778		135,602	Platinum, pyrite.
1931					309,314	28,148	331,165							(2)		2,816	154,163		149,794	Barite, granite, lead, platinum, pyrite.
1932					295,981	18,647	529,035									3,973	58,306		125	Unapportioned.
1933					885,108	54,727	818,200							(2)		6,884	233,110	14,883 lbs.	551 199,873	Lead. Platinum, pyrite.
1934					388,775	31,102	718,583							(2)		16,816	147,070		231,609	Lead, platinum, pyrite.
1935					6,179	513	962,448									23,805	72,850		290,646	Chromite, lead, pyrite.
1936							1,304,590									22,715	97,265		275,332	Copper, lead, platinum, pyrite.
1937					88,985	10,767	1,773,275									30,786	108,039		276,556	
1938							1,439,920									18,599	80,520		252,988	Granite (volcanic rock), platinum, pyrite, sandstone, lead, copper.
1939					(2)		1,566,810							(2)		23,468	255,839	3,790 lbs.	178 212,252	Lead. Copper, granite, platinum, pyrite.
1940					1,714,324	193,710	1,479,136							(2)		65,495	782,172	1,995 lbs.	100 279,175	Lead. Platinum, pyrite, sandstone, talc.
1941			(2)		116,412	13,737	1,719,760							(2)		18,327	1,678,020		329,004	Chromite, lead, platinum, pyrite, sandstone.
1942			(2)		(2)		(2)							(2)		(2)	2,581,053		1,444,170	Asbestos, chromite, copper, gold, iron ore, lead, mineral water, pyrite, sandstone, silver.
1943			(2)		1,380,149	179,419	75,670					(2)		(2)		22,725	2,259,567	9,523 lbs. 477,474 lbs.	714 51,567 1,177,055	Lead. Zinc. Chromite, iron ore, manganese ore, mineral water, pyrites.
Totals	47,287	$277,090	25,391	$421,109	(2)669,431,740	$110,311,655	$44,572,712	244,778	$188,060	711,064	$715,399	700,455	$201,310	(2)1,205,645	$4,003,795	(2)$11,785,892	$10,648,900		$17,881,745	

Grand total value, $201,007,676.

1 Dredge production included under Stanislaus County.
(2) See under 'Unapportioned.'
3 Includes crushed rock, rubble, rip-rap, sand and gravel.

MINERAL PRODUCTION OF

Year	Gold, value	Silver, value	Chromite		Mineral water	
			Tons	Value	Gallons	Value
1880	$440,735	$95,340				
1881	850,000	1,500				
1882	720,000					
1883	400,000					
1884	475,000					
1885	338,659					
1886	342,677	64				
1887	606,859	177				
1888	625,000					
1889	915,294	370				
1890	860,303	23				
1891	957,220	120				
1892	1,013,332	56				
1893	799,108					
1894	760,782					
1895	950,006	177			200,000	$80,800
1896	1,091,265	653			[3]	
1897	842,123	34			[3]	
1898	768,804	321			[3]	
1899	991,771	100			[3]	
1900	951,397	[2]6,700			700,000	45,000
1901	886,043	[2]2,980			700,000	175,000
1902	906,989	233			750,000	187,500
1903	613,576	22			750,000	50,000
1904	892,685	1,230			750,000	50,000
1905	803,035	2,499			[3]	
1906	[3]	[3]			[3]	
1907	398,017	3,037			725,000	36,250
1908	504,156	6,125			700,000	80,000
1909	416,160	2,145			500,000	10,000
1910	437,376	2,322			500,000	60,000
1911	422,297	2,561			700,000	120,000
1912	472,314	2,980	220	$2,310	700,000	120,000
1913	[4]180,125	[4]1,228			700,000	120,000
1914	312,842	1,026			650,000	65,000
1915	426,716	2,081	[3]		626,680	62,990
1916	441,307	2,312	2,251	28,731	502,650	50,530
1917	325,550	16,883	2,046	49,797	503,000	50,600
1918	294,227	14,501	6,612	336,588	501,750	50,175
1919	226,525	17,049	510	13,379	451,500	90,375
1920	80,707	5,218	215	5,732	300,150	60,015
1921	42,635	294	[3]		250,150	5,015
1922	75,105	612				
1923	45,633	298			200,150	4,042
1924	63,570	296				6,100

SISKIYOU COUNTY, 1880-1943

Platinum group metals		Miscellaneous stone[1], value	Miscellaneous and unapportioned		
Ounces	Value		Amount	Value	Substance
100	$600				
				$1,202,742	Unapportioned, 1900-1909.
			200 lbs.	23	Copper.
1.6	21				
5.3	93		2,500 cu. ft.	1,250	Sandstone.
			2,500 cu. ft.	1,500	Sandstone.
		$39,000	193 lbs. 2,643 lbs. 11,433 cu. ft. 1,000 bbls. 220 tons	39 140 12,897 1,000 300	Copper. Lead. Sandstone. Lime. Limestone.
			4,949 lbs. 1,800 cu. ft. 1,090 lbs.	1,183 1,485 1,680	Lead. Sandstone. Lime.
		5,028	3,360 lbs. 50 tons 1,050 cu. ft. 100 bbls. 2,225 tons	144 500 1,750 300 2,200	Lead. Pumice. Sandstone. Lime. Limestone.
		9,475	 1,204 cu. ft. 335 bbls. 35 tons	14,745 2,000 735 525	Gems. Sandstone. Lime. Limestone.
		6,580	 150 bbls. 24 tons 650 cu. ft.	1,000 120 24 455	Gems. Lime. Limestone. Sandstone.
		609	250 cu. ft. 	250 250	Sandstone. Gems.
		4,883	 90 tons 	250 2,000 1,500	Gems. Pumice. Other minerals.
9	304	5,371	100 tons 58 lbs. 677 bbls. 250 cu. ft.	500 2 629 150	Coal. Lead. Lime. Sandstone.
		4,630	188 lbs. 745 bbls. 	9 745 16,923	Lead. Lime. Chromite, copper, marble, sandstone.
[3]		45,407		12,609	Copper, building stone, lime, platinum, sandstone.
15	709	134,382	 888,043 lbs. 192 lbs. 	500 242,436 17 8,535	Granite. Copper. Lead. Lime, sandstone, soda.
1	58	24,588	573,593 lbs. 	141,677 15,473	Copper. Lead and pumice.
7	1,015	26,405		111,294	Copper, limestone, pumice, quicksilver.
		30,322		47,121	Copper, lime, limestone, potash, pumice, quicksilver.
[3]		44,343		1,060	Asbestos, brick, chromite, lime, platinum.
		21,726		4,020	Other minerals.[5]
3	339	129,291		1,408	Other minerals.[6]
		67,787		3,034	Other minerals.[7]

MINERAL PRODUCTION OF

Year	Gold, value	Silver, value	Chromite		Mineral water [1]	
			Tons	Value	Gallons	Value
1925	$180,120	$831			[3]	
1926	141,240	709			[3]	
1927	138,822	586			[3]	
1928	85,717	421			[3]	
1929	63,843	863			[3]	
1930	70,332	4,172			[3]	
1931	74,326	169			[3]	
1932	133,115	304			[3]	
1933	324,954	686			[3]	
1934	528,395	1,861			[3]	
1935	575,676	1,610			[3]	
1936	639,030	2,873				
1937	1,055,600	3,420			[3]	
1938	1,294,230	3,335			[3]	
1939	1,708,840	5,196	[3]		[3]	
1940	2,068,815	6,651			[3]	
1941	2,351,790	7,135	[3]		[3]	
1942	1,356,530	4,187	[3]		[3]	
1943	110,040	6,712	[3]		[3]	
Totals	$37,869,340	$245,288	11,854	$436,537	[3]12,361,030	$1,579,392

Grand total value, $47,356,154.

[1] Includes crushed rock, rubble, rip-rap, sand, gravel.
[2] Recalculated to 'commercial,' from 'coining value' as originally published.
[3] See under 'Unapportioned.'
[4] Production from dredging operations included in Stanislaus County production.
[5] Includes limestone and mineral water.
[6] Includes lead and lime.
[7] Includes coal, limestone, lime and platinum.

SISKIYOU COUNTY, 1880-1943—Continued

Platinum group metals		Miscellaneous stone[1], value	Miscellaneous and unapportioned		
Ounces	Value		Amount	Value	Substance
[3]	------------	$23,800	------------	$3,535	Lime and limestone.
			------------	11,340	Mineral water, platinum, sandstone.
16	$1,780	327,569	------------	22,853	Coal, lead, mineral water, sandstone.
10	690	102,428	------------	56,420	Mineral water, sandstone.
------------	------------	370,833	------------	14,195	Copper, lead, gems (rhodonite), mineral water.
------------	------------	110,878	------------	54,205	Copper, lead, limestone, quicksilver, mineral water.
------------	------------	85,851	------------	75,046	Copper, lead, granite, mineral water, gems, platinum quicksilver, lime, pumice.
------------	------------	79,772	------------	32,740	Other minerals.
------------	------------	23,415	------------	27,185	Lead, quicksilver, mineral water.
------------	------------	29,036	------------	19,502	Copper, lead, mineral water, pumice.
------------	------------	67,216	------------	50,694	Copper, lead, mineral water, pumice, tube-mill pebbles.
[3]	------------	66,664	------------	61,787	Copper, mineral water, pumice, tube-mill pebbles.
			1,805 lbs.	166	Copper.
------------	------------	106,182	6,088 tons	49,200	Pumice.
			------------	33,652	Lead, mineral water, platinum, tube-mill pebbles.
------------	------------	103,519	1,168 lbs.	144	Copper.
			------------	37,668	Lead, gems, mineral water, pumice, quicksilver, tube-mill pebbles.
[3]	------------	116,331	------------	96,919	Copper, lead, mineral water, platinum, pumice, tube-mill pebbles.
[3]	------------	99,906	701 tons	5,169	Pumice.
			------------	30,884	Chromite, mineral water, platinum, tube-mill pebbles.
[3]	------------	102,923	637 tons	2,250	Pumice and scoria.
			------------	38,564	Copper, mineral water, platinum.
[3]	------------	141,439	7,132 tons	16,330	Pumice.
			------------	61,531	Chromite, copper, lead, mineral water, platinum quicksilver.
[3]	------------	105,952	7,668 lbs.	928	Copper.
			------------	152,917	Chromite, gems, lead, mineral water, pumice, quicksilver, platinum.
------------	------------	221,837	9,707,958 lbs.	1,262,035	Copper.
			------------	295,622	Chromite, manganese ore, mineral water, quicksilver.
167.9	$5,609	$2,845,378	------------	$4,374,610	

MINERAL PRODUCTION OF

Year	Quicksilver		Mineral water		Lime and limestone	
	Flasks	Value	Gallons	Value	Tons	Value
1873	1,800	$144,594				
1874	1,900	199,842				
1875	2,100	176,715				
1876	1,683	74,052				
1877	1,463	54,570				
1878	802	26,386				
1879	1,290	38,507				
1880	492	15,252				
1881-1893 (inc.)						
1894					6,400	$8,000
1895					4,300	4,635
1896			3,094	$1,547	5,477	5,989
1897					9,608	9,801
1898					6,125	5,570
1899			20,000	4,000		356
1900			20,000	4,000	1,800	1,800
1901			17,800	4,450		5,950
1902	42	1,890	10,000	4,000		
1903	100	4,100	10,000	4,000		
1904	[2]377	15,080	10,000	4,000		
1905	542	18,518	10,000	4,000	100,000	100,000
1906	528	19,272	4,000	4,000		
1907	640	24,422	40,000	4,000		
1908	764	33,294	140,000	11,600		
1909			32,650	5,490		
1910			32,400	3,960		
1911			30,000	4,000		
1912			285,050	44,000		
1913			23,600	3,440		
1914	320	15,696	43,020	5,208	86,128	86,128
1915	[3]		64,200	8,000		
1916	660	61,710	11,200	3,750		
1917	554	52,765	10,960	2,580		
1918	593	59,122	11,4[illegible]0	2,722		
1919	[3]		[3]			
1920	[3]		[3]		[3]	
1921			[3]			
1922			[3]			
1923	[3]		[3]			
1924			[3]			
1925			[3]			
1926			[3]			
1927			[3]			
1928			[3]			
1929			[3]			
1930	[3]					
1931						
1932						
1933						
1934						
1935	[3]					
1936	[3]					
1937	[3]					
1938	[3]					
1939	[3]					
1940	[3]					
1941	[3]					
1942						
1943						
Totals	[3]16,650	$1,035,787	[3]829,324	$132,747	[3]219,838	$228,229

Grand total value, $59,244,342.

[1] Includes crushed rock, rubble, paving blocks, sand, gravel.
[2] Flasks of 76½ pounds previous to June, 1904; of 75 pounds thence, through 1927; of 76 pounds since January, 1928.
[3] See under 'Unapportioned.'

SOLANO COUNTY, 1873-1943

Miscellaneous stone[1], value	Natural gas, value	Miscellaneous and unapportioned: Amount	Value	Substance
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$225	----------	----------	----------	
19,650	----------	----------	----------	
15,752	----------	75 tons	$125	Pottery clay.
20,975	----------	400 tons	500	Pottery clay.
15,065	----------	----------	----------	
12,181	----------	----------	----------	
18,900	----------	----------	----------	
2,200	----------	----------	----------	
14,250	----------	75,000 bbls.	150,000	Cement.
21,514	----------	250,000 bbls.	375,000	Cement.
11,113	----------	----------	----------	
78,573	----------	----------	----------	
143,487	----------	----------	----------	
202,146	$6,584	125 tons	600	Salt.
		3,000 M	25,000	Brick.
527,319	8,053	400 tons	2,800	Salt.
		1,000 M	7,000	Brick.
176,813	7,538	100 tons	200	Salt.
		1,600 M	20,000	Brick.
		5,600 tons	11,200	Clay.
241,949	9,100	50 tons	150	Salt.
181,952	8,596	100 tons	300	Salt.
		500 M	4,000	Brick.
130,445	8,528	50 tons	100	Salt.
		2,200 M.	20,000	Brick.
28,915	7,366	----------	13,570,019	Unapportioned, 1900-1913, inclusive.
71,288	5,546	----------	1,500,000	Other minerals.
37,576	[3]	----------	1,290,347	Cement, fuller's earth, natural gas, quicksilver, salt.
49,711	[3]	----------	1,090,164	Cement, natural gas, salt.
39,826	[3]	----------	1,804,060	Cement, fuller's earth, natural gas, salt.
30,124	[3]	----------	1,378,758	Cement, fuller's earth, natural gas, onyx, salt.
44,156	[3]	----------	1,627,928	Cement, fuller's earth, mineral water, natural gas, quicksilver.
[3]	[3]	----------	2,930,614	Cement, limestone, onyx, mineral water, natural gas, quicksilver miscellaneous stone.
60,604	----------	----------	2,969,594	Cement, mineral water, onyx.
103,394	----------	----------	3,004,720	Cement, mineral water, onyx.
113,545	----------	----------	3,263,340	Cement, mineral water, onyx, quicksilver.
117,475	----------	----------	2,972,000	Cement, mineral water, onyx.
145,484	----------	----------	2,678,547	Cement, mineral water, onyx.
----------	----------	----------	1,770,820	Onyx, travertine, cement, mineral water.
[3]	----------	----------	1,557,840	Cement, clay (pottery), mineral water, miscellaneous stone travertine.
[3]	----------	----------	57,451	Mineral water, onyx, travertine, miscellaneous stone.
[3]	----------	----------	66,421	Mineral water, onyx, travertine, miscellaneous stone.
[3]	----------	----------	46,638	Onyx, travertine, quicksilver, miscellaneous stone.
[3]	----------	----------	62,270	Onyx, travertine, miscellaneous stone.
[3]	----------	----------	36,202	Onyx, travertine, miscellaneous stone.
[3]	----------	----------	16,996	Onyx, travertine, miscellaneous stone.
[3]	----------	----------	23,641	Onyx, travertine, miscellaneous stone.
----------	----------	----------	5,450	Onyx and travertine.
2,000	[3]	----------	46,552	Natural gas, travertine, quicksilver, miscellaneous stone.
[3]	[3]	----------	145,567	Natural gas, quicksilver, miscellaneous stone.
[3]	[3]	----------	431,677	Natural gas, quicksilver, miscellaneous stone.
[3]	604,868	----------	35,156	Quicksilver, miscellaneous stone, travertine.
[3]	666,790	----------	42,145	Quicksilver, miscellaneous stone, travertine.
117,180	1,006,033	----------	18,122	Quicksilver, granite (volcanic tuff), travertine.
57,500	2,622,523	----------	405	Other minerals.
151,537	4,780,407	----------	----------	
$3,045,224	[2]$9,741,932	----------	$45,060,423	

MINERAL PRODUCTION OF

Year	Quicksilver		Mineral paint		Brick	
	Flasks	Value	Tons	Value	M	Value
1873	50	$4,017				
1874	1,700	178,806				
1875	1,218	102,495				
1876	3,897	171,468				
1877	3,609	134,616				
1878	3,255	106,890				
1879	2,977	88,923				
1880	1,445	44,795				
1881	1,273	37,974				
1882	2,124	59,960				
1883	1,669	47,984				
1884	332	10,126				
1885	446	13,715				
1886	735	26,093				
1887	689	29,196			1,000	$5,000
1888	1,151	48,918			1,000	5,000
1889	1,345	60,525				
1890	1,046	54,915				
1891	1,660	75,115				
1892	1,630	66,357				
1893	1,445	53,104				
1894	1,368	41,998	100	$3,500	375	1,875
1895	1,813	70,707	225	3,375	350	1,750
1896	1,126	37,150	220	3,740	250	1,250
1897	1,538	59,982	270	3,780	300	1,500
1898	1,704	63,048			350	2,800
1899	2,119	105,950			200	1,800
1900	2,209	99,500			280	2,360
1901	2,130	95,850			150	1,200
1902	1,440	64,685	30	105	150	1,200
1903	2,404	98,676	800	320	160	1,440
1904	2,700	102,829			175	1,750
1905	2,504	97,041			500	4,000
1906	2,070	75,555			6,800	115,000
1907	560	21,369			11,600	133,479
1908	590	24,939			11,000	83,000
1909	344	14,226			6,500	29,000
1910	260	11,765				
1911	94	4,325				
1912	646	27,158				
1913	12	48				
1914	13	638				
1915	159	21,793				
1916	1,039	97,140				
1917	2,592	24,481				
1918	2,417	28,223				
1919	1,418	119,142				
1920	[5]					
1921	[5]					
1922	[5]					
1923	528	31,147				
1924	867	60,840				
1925	351	29,134				
1926						
1927	373	43,068				
1928	[5]					
1929	[5]					
1930	[5]					

SONOMA COUNTY, 1873-1943

Mineral water		Miscellaneous stone[1], value	Magnesite		Miscellaneous and unapportioned		
Gallons	Value		Tons	Value	Amount	Value	Substance
--------	--------	[6]	--------	--------	--------	--------	
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--------	--------	--------	--------	--------	--------	--------	
--------	--------	$350,000	--------	--------	--------	--------	
--------	--------	367,500	--------	--------	--------	--------	
--------	--------	[2]297,236	--------	--------	--------	--------	
--------	--------	[3]245,000	--------	--------	--------	--------	
--------	--------	[3]150,000	--------	--------	--------	--------	
--------	--------	96,000	--------	--------	--------	--------	
--------	--------	92,800	--------	--------	--------	--------	
--------	--------	57,381	--------	--------	--------	--------	
8,000	$32,500	69,508	--------	--------	--------	--------	
14,400	19,287	73,719	--------	--------	--------	--------	
236,000	24,000	33,035	--------	--------	--------	--------	
246,680	23,490	43,371	--------	--------	--------	--------	
21,000	18,500	16,830	--------	--------	--------	--------	
575,000	35,000	20,275	--------	--------	--------	--------	
60,900	17,691	52,701	175	$1,225	64 tons	$4,460	Graphite.
30,000	9,100	121,578	130	455	42 tons	1,680	Graphite
10,000	4,000	90,933	--------	--------	--------	--------	
11,000	4,400	75,947	--------	--------	1,500 bbls.	2,250	Lime.
10,000	4,000	213,830	--------	--------	--------	--------	
10,000	4,000	158,218	--------	--------	--------	300	Gems.
12,000	4,200	132,946	250	1,250	1,500 bbls. -------- 10,500 tons	2,600 50 10,700	Lime. Gems. Clay.
10,000	1,000	307,695	15	180	2,600 tons	3,000	Clay.
104,000	21,350	319,716	--------	--------	500 tons --------	5,500 15,000	Clay. Unapportioned, 1900-1909.
235,000	50,350	220,998	--------	--------	--------	--------	
202,500	50,250	184,035	--------	--------	--------	1,000	Unapportioned.
62,500	20,950	295,198	300	3,000	--------	--------	
96,240	46,910	191,436	--------	--------	--------	--------	
80,015	46,160	276,516	213	2,130	--------	700	Other minerals.
258,600	41,231	177,917	3,624	34,788	--------	375	Other minerals.
121,366	28,031	232,113	11,653	98,280	243 tons --------	2,478 14,000	Chromite. Building stone, manganese.
121,290	35,031	146,621	5,636	61,335	226 tons 362 tons --------	6,200 12,689 64	Chromite. Manganese. Other minerals.
83,220	36,050	148,347	4,110	40,010	1,540 tons 173 tons --------	73,906 7,645 100	Chromite. Manganese. Other minerals.
96,800	22,820	144,014	--------	--------	--------	62	Building stone, curbing.
29,928	6,578	217,667	[5]	--------	--------	63,000	Magnesite, quicksilver.
37,641	9,891	151,300	[5]	--------	--------	14,360	Gems, magnesite, quicksilver.
35,843	9,108	162,679	--------	--------	--------	50,154	Pottery clay, gems, quicksilver.
30,661	7,106	189,059	--------	--------	--------	--------	
31,003	8,002	101,009	--------	--------	--------	2,200	
17,713	6,679	119,546	--------	--------	--------	4,872	Pottery clay, building stone, manganese.
36,272	7,752	208,479	--------	--------	--------	6,355	Pottery clay, gems, manganese ore, petroleum, quicksilver.
25,428	5,889	208,753	--------	--------	--------	7,682	Petroleum, sandstone.
32,720	9,127	111,429	--------	--------	-------- --------	6,250 85,763	Sandstone. Chromite, gems, quicksilver.
20,701	7,376	243,383	--------	--------	-------- --------	13,351 87,208	Sandstone. Chromite, gems, quicksilver.
17,900	5,318	263,644	--------	--------	--------	61,437	Quicksilver, sandstone.

MINERAL PRODUCTION OF

Year	Quicksilver		Mineral paint		Brick	
	Flasks	Value	Tons	Value	M	Value
1931	449	$39,392				
1932	247	11,642				
1933						
1934	393	27,288				
1935	110	7,845				
1936	182	14,081				
1937	281	22,085				
1938	425	29,641				
1939	255	27,212				
1940	1,144	188,467				
1941	3,195	590,263				
1942	4,115	779,930				
1943	4,121	761,654				
Totals	[5]586,081	$5,960,779	1,645	$14,820	41,140	$393,404

Grand total value, $19,228,471.

[1] Includes crushed rock, rubble, rip-rap, paving blocks, sand, gravel.
[2] Eleventh Census Report, Vol. X, Part 3, p. 605.
[3] Estimated.
[4] Flasks of 76½ pounds previous to June, 1904; of 75 pounds thence, through 1927; of 76 pounds since January, 1928.
[5] See under 'Unapportioned.'
[6] There was a considerable production of paving blocks in Sonoma County in the '70's and '80's, but no available records of annual amounts or values.

SONOMA COUNTY, 1873-1943—Continued

Mineral water		Miscellaneous stone[1], value	Magnesite		Miscellaneous and unapportioned		
Gallons	Value		Tons	Value	Amount	Value	Substance
44,576	$8,227	$204,702	----------	----------	--------------	315	Unapportioned.
15,864	4,123	151,734	----------	----------	--------------	350	Unapportioned.
23,016	2,390	147,266	----------	----------	--------------	8,332	Granite (tuff), quicksilver.
12,944	2,786	130,616	----------	----------	--------------	1,375	Unapportioned.
24,474	4,295	146,963	----------	----------	--------------	11,280	Granite (volcanic rock).
26,642	6,460	160,068	----------	----------	--------------	317	Gold.
----------	----------	----------	----------	----------	--------------	4,808	Pottery clay, gems, granite (tuff).
[5]	----------	235,585	----------	----------	--------------	15,393	Pottery clay, granite (tuff), lime, mineral water, sandstone.
23,604	4,365	[5]					
53,860	6,949	284,616	----------	----------	--------------	198,489	Pottery clay, granite (tuff), miscellaneous stone.
12,028	3,288	229,033	----------	----------	--------------	10,292	Pottery clay, granite (tuff).
88,756	12,722	584,421	----------	----------	--------------	11,972	Other minerals.
80,697	16,603	842,512	----------	----------	--------------	16,281	Granite (tuff), manganese ore, natural gas.
82,189	13,943	737,048	----------	----------	--------------	8,669	Chromite, granite (tuff).
[5]3,520,971	$769,278	$11,234,926	[5]25,236	$242,653	--------------	$855,264	

MINERAL PRODUCTION OF

Year	Gold, value	Silver, value	Brick		Magnesite		Manganese	
			M	Value	Tons	Value	Tons	Value
1880	$73,271							
1881	63,000	$31,000						
1882	80,000	15,000						
1883	40,000	5,000						
1884	40,000	5,000						
1885	18,660							
1886	47,175							
1887	53,297							
1888	75,000							
1889	20,410							
1890	5,335							
1891	3,000							
1892	14,191							
1893	150							
1894	26,369							
1895	26,482							
1896	16,635							
1897	37,392							
1898	19,400							
1899	10,000							
1900	[1]21,212							
1901	[1]15,700				100	$600		
1902								
1903	[1]52,869	256						
1904	[1]50,000	265						
1905	[1]50,000	240						
1906	[3]	[3]						
1907	3,364	28						
1908	[2]	[2]	750	$7,000				
1909	[2]	[2]	5,000	50,000				
1910	[1]214,187	[1]604	1,500	8,000				
1911	[4]307,538	[4]1,131	850	5,950				
1912	[1]226,163	[1]1,974	250	2,000				
1913	[5]253,166	[2]671	300	2,400				
1914	[2]	[2]	250	2,500				
1915	[3]	[3]						
1916	[3]	[3]	[3]				160	$2,400
1917	[3]	[3]			3,196	44,350	775	26,925
1918	14,196	592			2,024	18,038	5,753	222,422
1919	[3]	[3]			2,031	20,831	8,921	374,584
1920	142,467	775			4,064	39,435	893	12,973
1921	18,439	136			3,378	33,158	[3]	
1922	[3]	[3]			2,400	35,475	[3]	[3]
1923	174,814	833						
1924	190,019	773					[3]	
1925	171,742	694					[3]	
1926	127,398	411					[3]	
1927	120,238	345					[3]	
1928	195,683	556			[3]			
1929	128,872	344			[3]		[3]	
1930	109,134	208			[3]			
1931	154,443	223			[3]			
1932	152,865	194			[3]			
1933	148,204	241			[3]			
1934	239,158	544			[3]			
1935	293,129	765			[3]			
1936	289,975	766			[3]			
1937	603,645	1,470			[3]			
1938	453,250	861			[3]			
1939	762,685	1,187			[3]			
1940	1,276,240	1,847			[3]		[3]	
1941	891,520	1,646			[3]		[3]	
1942	972,825	1,809			[2]		[3]	
1943	261,660	367			[3]		[3]	
Totals	[3]$9,862,567	[3]$78,756	[2]8,900	$77,850	[3]17,093	$191,287	[3]16,502	$639,304

Grand total value, $19,298,003.

[1] Includes Merced County.
[2] See Merced County.
[3] See under 'Unapportioned.'
[4] Includes Merced County production; also dredge yield of Shasta and Trinity counties.
[5] Includes dredge production of Merced and Siskiyou counties.
[6] There was a small production of quicksilver in the '70's and between 1884-1888, but no definite record of amounts.

STANISLAUS COUNTY, 1880-1943

Mineral paint		Miscel-laneous stone, value	Miscellaneous and unapportioned		
Tons	Value		Amount	Value	Substance
----------	----------	----------	----------	----------	
----------	----------	----------	----------	----------	
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----------	----------	----------	----------	----------	
----------	----------	----------	----------	----------	
----------	----------	----------	----------	----------	
----------	----------	----------	----------	----------	
----------	----------	----------	----------	----------	Quicksilver.[6]
----------	----------	----------	----------	----------	
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----------	----------	----------	----------	----------	
----------	----------	----------	----------	----------	
----------	----------	----------	----------	----------	
105	$2,310	----------	----------	----------	
375	2,800	----------	20 flasks	$800	Quicksilver.
17	1,800	----------	----------	----------	
152	1,825	----------	----------	----------	
283	2,898	----------	----------	----------	
204	1,769	----------	----------	----------	
192	193	----------	----------	----------	
200	375	----------	79,330 lbs.	12,494	Copper.
200	350	----------	162,400 lbs.	18,676	Copper.
1,370	2,400	----------	116,000 lbs.	15,080	Copper.
200	1,600	----------	7,300 lbs. ----------	931 20	Copper. Platinum.
375	2,125	----------	----------	----------	
250	1,720	----------	----------	----------	
250	1,720	----------	----------	----------	
285	2,000	74,000	----------	----------	
285	2,225	225	----------	82,317	Unapportioned. 1900-1909.
40	270	----------	----------	----------	
96	600	----------	----------	----------	
100	600	63,572	----------	----------	
255	1,530	14,482	----------	----------	
52	286	3,096	----------	----------	
[3]	----------	2,250	----------	189,521	Gold, mineral paint, silver, platinum, quicksilver.
507	2,200	17,784	----------	230,638	Chromite, brick, gold, platinum, quicksilver, silver.
[3]	----------	6,240	1,438 tons ----------	29,240 183,167	Chromite. Gold, mineral paint, platinum, silver.
498	3,088	38,764	1,352 tons ----------	56,505 308	Chromite. Other minerals.
[3]	----------	28,922	----------	[1]165,989	Gold, mineral paint, platinum, silver.
669	7,062	181,262	----------	1,043	Platinum and quicksilver.
[3]	----------	180,697	----------	3,777	Manganese, mineral paint, platinum, quicksilver.
[3]	[3]	299,962	----------	116,730	Gold, manganese ore, mineral paint, platinum, silver.
1,023	10,745	231,965	----------	27,158	Magnesite, manganese ore, platinum.
[3]	----------	118,050	----------	30,296	Magnesite, manganese ore, mineral paint, platinum.
[3]	----------	221,256	----------	21,774	Magnesite, manganese ore, mineral paint, platinum.
[3]	----------	259,806	----------	12,957	Magnesite, mineral paint, platinum.
----------	----------	----------	----------	12,700	Magnesite, mineral paint, platinum.
[3]	----------	238,067	----------	37,852	Magnesite, mineral paint, platinum.
[3]	----------	233,325	----------	25,694	Clay (pottery), magnesite, manganese, mineral paint, platinum.
----------	----------	180,379	165 lbs. ----------	8 41,959	Lead. Clay (pottery), magnesite.
----------	----------	87,596	----------	35,019	Clay (pottery), magnesite, platinum.
----------	----------	55,595	607 lbs.	18	Lead.
----------	----------	40,888	----------	109,514	Clay (pottery), magnesite, platinum.
----------	----------	63,337	----------	115,133	Clay (pottery), magnesite, platinum.
----------	----------	111,912	----------	179,850	Pottery clay and magnesite.
----------	----------	177,015	----------	223,858	Pottery clay, magnesite, platinum.
----------	----------	57,147	----------	277,768	Other minerals.
----------	----------	290,036	----------	101,376	Pottery clay, magnesite, platinum.
----------	----------	134,582	----------	171,582	Pottery clay, magnesite, platinum.
----------	----------	61,306	----------	218,812	Pottery clay, magnesite, manganese ore, platinum.
----------	----------	148,644	----------	284,122	Pottery clay, magnesite, manganese ore, natural gas, platinum.
[3]	----------	222,241	----------	278,487	Pottery clay, magnesite, manganese ore, mineral paint, quicksilver, platinum, natural gas.
[3]	----------	397,616	----------	452,843	Pottery clay, gems (quartz), magnesite, manganese ore, mineral paint, natural gas, platinum, silica (quartz).
[3]7,920	[3]$54,491	$4,503,250	----------	$3,890,498	

MINERAL PRODUCTION OF SUTTER COUNTY, 1908-1943

Year	Amount	Value	Substance
1908	5,000 tons	$5,000	Macadam.
1909			
1916	5,733 tons	6,450	Crushed rock.
1917	4,500 tons	5,000	Crushed rock.
1918			
1919			
1920		54	Miscellaneous stone, natural gas.
1921		54	Miscellaneous stone, natural gas.
1922		97	Miscellaneous stone, natural gas.
1923		97	Miscellaneous stone, natural gas.
1924		97	Miscellaneous stone, natural gas.
1925		397	Miscellaneous stone, natural gas.
1926		397	Miscellaneous stone, natural gas.
1927		300	Miscellaneous stone, natural gas.
1928			
1933		11,900	Miscellaneous stone, natural gas.
1934		3,322	Miscellaneous stone, natural gas.
1935		357	Natural gas.
1936		17,368	Pottery clay, natural gas.
1937		22,959	Pottery clay, natural gas.
1938		28,973	Pottery clay, natural gas.
1939		68,733	Pottery clay, natural gas.
1940		94,054	Pottery clay, natural gas.
1941		112,848	Pottery clay, natural gas.
1942		95,438	Pottery clay, natural gas.
1943		74,905	Pottery clay, natural gas.
Totals		$548,800	

Tehama County

MINERAL PRODUCTION OF

Year	Gold, value	Chromite		Brick	
		Tons	Value	M	Value
1880-1884	$22,000				
1894		1,680	$12,680		
1895		950	9,025	500	$2,50
1896		56	475		
1897					
1898				200	1,40
1899				300	1,80
1900				325	2,20
1901				300	2,00
1902				500	3,50
1903				600	4,50
1904				500	3,50
1905				650	5,00
1906				700	5,60
1907				400	3,20
1908				400	3,00
1909					
1910				600	3,60
1911					
1912				225	1,30
1913				300	1,80
1914					
1915		[2]		400	2,70
1916		1,896	39,702	[2]	
1917		2,053	41,646		
1918		3,261	152,291		
1919		[2]			
1920					
1921					
1922				[2]	
1923					
1924		[2]		[2]	
1925				[2]	
1926		[2]		[2]	
1927					
1928					
1929		[2]			
1930				[2]	
1931					
1932				[2]	
1933					
1934	1,146				
1935	177				
1936					
1937					
1938	[2]				
1939	31,675				
1940					
1941					
1942		[2]			
1943		[2]			
Totals	[2]$54,998	[2]9,896	$255,819	[2]6,800	$47,60

Grand total value, $1,567,877.
[1] Includes crushed rock, rubble, sand, gravel.
[2] See under 'Unapportioned.'

TEHAMA COUNTY, 1880-1943

Mineral water		Salt, value	Miscellaneous stone,[1] value	Miscellaneous and unapportioned		
Gallons	Value			Amount	Value	Substance
10,000	$2,400					
54,000	8,000					
10,000	18,000					
20,000	4,000					
5,000	2,500					
8,000	4,000					
8,000	4,000					
550,000	55,000					
20,000	2,000	$300				
5,000	500	300				
5,000	500	300				
5,000	500					
75	42		$600			
100	100	200				
1,000	500	[2]	750		$752	Chromite and salt.
[2]			11,076		3,575	Brick, granite, mineral water, natural gas.
			2,373			
			2,500		2,800	Other minerals.
			7,500		1,500	Other minerals.
			[2]		26,400	Unapportioned.
			30,520		300	Other minerals.
			[2]		9,388	Brick, miscellaneous stone.
			4,900		1,316	Other minerals.
			26,054		8,400	Brick, chromite.
			[2]		77,183	Brick, miscellaneous stone.
			2,100		8,240	Brick, chromite.
			4,450		900	Other minerals.
			11,945		2,444	Other minerals.
			9,956		4,524	Chromite and sandstone.
			218,300		8,100	Brick and sandstone
			49,407		1,000	Other minerals.
			11,887		2,500	Brick and sandstone.
			30,309		25	Other minerals.
			38,427	3 ozs.	2	Silver.
			11,214			
			100,403			
			65,193			
			[2]		81,431	Gold, platinum, silver, miscellaneous stone.
			44,956		46	Silver.
					5,417	Other minerals.
			51,880			
			2,925			
			[2]		47,533	Chromite, miscellaneous stone.
			[2]		72,917	Chromite, miscellaneous stone.
[2]701,175	$102,042	[2]$1,100	[2]$739,625		$366,693	

MINERAL PRODUCTION OF

Year	Gold, value	Silver, value	Quicksilver	
			Flasks	Value
Altoona Mine, before 1875 (estimated)*	[illegible]	[illegible]	1,000	$88,000
1875			1,500	126,425
1876			1,979	87,076
1877			1,317	49,129
1878			1,534	50,469
1879			1,919	57,282
1880	$326,693	$142	245	7,595
1881	550,000	1,500		
1882	600,000			
1883	400,000			
1884	529,150	[2]334		
1885	338,148	10		
1886	464,726	219		
1887	553,051	924		
1888	589,000	500		
1889	811,632	640		
1890	1,192,790	259	240	12,600
1891	1,327,787	2,249		
1892	1,446,603	168		
1893	1,122,995			
1894	1,012,666	325		
1895	1,166,745	1,257	3,926	137,410
1896	1,296,330		4,205	139,035
1897	1,078,372	259	838	29,330
1898	859,255	314	4,032	151,200
1899	590,510	1,086	3,076	123,624
1900	571,605	[3]7,935	2,294	105,982
1901	684,683	[3]1,240	1,302	58,668
1902	719,992	550	240	10,251
1903	607,728	2,085	266	11,156
1904	574,814	135	[7]102	3,864
1905	690,844	3,044	389	13,917
1906	560,843	2,981	166	6,059
1907	535,316	2,399	98	3,739
1908	602,944	4,269	90	3,808
1909	520,046	2,302	197	7,915
1910	500,851	1,960	133	5,622
1911	612,149	6,777	44	2,024
1912	723,503	7,494	18	758
1913	431,862	2,119	4	161
1914	743,512	3,374		
1915	441,846	3,470	[illegible]	
1916	435,493	7,591	[illegible]	
1917	602,048	10,021	[illegible]	
1918	444,729	6,912	[illegible]	
1919	538,494	3,872	[illegible]	
1920	541,387	3,469	[illegible]	
1921	437,993	1,390		
1922	182,918	2,432		
1923	617,841	5,816		
1924	422,281	10,934		
1925	424,037	7,724		
1926	483,471	13,276		
1927	409,492	12,326		
1928	402,694	12,258		
1929	352,029	10,269	[illegible]	
1930	330,003	6,700	[illegible]	
1931	292,031	532		

TRINITY COUNTY, 1875-1943

Platinum		Miscellaneous stone[1], value	Miscellaneous and unapportioned		
Ounces	Value		Amount	Value	Substance
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--------	--------	--------	3,620 cu. ft.	$5,000	Granite.
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--------	--------	--------	500 cu. ft.	375	Granite.
--------	--------	--------	5,750 cu. ft.	4,535	Granite.
--------	--------	--------	4,838 lbs. 6,870 cu. ft.	761 5,500	Copper. Granite.
39	$468	--------	--------	--------	
13	200	--------	100 cu. ft.	75	Granite.
11	275	--------	--------	--------	
26	450	--------	--------	--------	
7	130	--------	--------	--------	
[4]	--------	--------	--------	--------	
[4]	--------	--------	--------	--------	
[4]	--------	--------	--------	111,307	Unapportioned, 1900-1909.
[4]	--------	--------	--------	--------	
[4]	--------	--------	--------	--------	
[4]	--------	$2,000	--------	--------	
[4]	--------	1,000	--------	--------	
5	151	--------	--------	245	Mineral water.
13	435	900	120 gals. --------	360 52,500	Mineral water. Other minerals.
113	5,161	1,000	--------	397,316	Chromite, copper, manganese, mineral water, quicksilver.
50	3,283	7,718	242 tons, --------	6,325 358,447	Chromite. Copper, manganese, mineral water, quicksilvcr.
41	3,136	1,513	1,814 tons, --------	75,660 175,574	Chromite. Copper, mineral water, quicksilver.
(4) (5) fine ounces	--------	11,839	--------	17,444	Copper, mineral water, platinum, quicksilver.
37	6,612	8,799	--------	1,838	Other minerals.
27	3,260	[4]	--------	14,239	Quicksilver, miscellaneous stone.
12	1,223	5,677	--------	5,687	
18	2,050	3,000	329,706 lbs.	48,467	Copper.
11	1,839	2,240	550,000 lbs.	72,050	Copper.
26	3,081	5,000	439,766 lbs.	62,447	Copper.
28	2,832	--------	760,140 bls. --------	106,420 4,000	Copper. Other mineral
--------	--------	32,250	770,882 lbs. --------	100,986 800	Copper. Other minerals.
[4]	--------	12,084	660,142 lbs. --------	95,060 8,084	Copper. Chromite and platinum
--------	--------	41,867	615,579 lbs. --------	108,342 13,367	Copper. Chromite, coal, quicksilver.
[4]	--------	4,238	588,574 lbs. --------	76,514 19,878	Copper. Coal, platinum, quicksilver.
31	993	20,246	--------	14,720	Coal, quicksilver.

MINERAL PRODUCTION OF

Year	Gold, value	Silver, value	Quicksilver	
			Flasks	Value
1932	$294,297	$608	[4]	----------
1933	345,851	768	[4]	----------
1934	574,681	1,640	[4]	----------
1935	727,787	2,506	[4]	----------
1936	708,715	2,251	[4]	----------
1937	703,780	2,099	[4]	----------
1938	1,451,345	2,992	[4]	----------
1939	1,488,550	3,176	[4]	----------
1940	1,730,155	4,222	[4]	----------
1941	1,500,870	3,408	[4]	----------
1942	846,895	2,001	[4]	----------
1943	31,115	64	[4]	----------
Totals	$43,099,973	$203,579	[4]31,154	[4]$1,293,099

Grand total value, $47,572,471.

[*] Bradley, W. W., Quicksilver resources of California; Cal. State Min. Bur., Bull. 78, p. 200, 1918.
[1] Includes crushed rock, rubble, sand, gravel.
[2] Lawyer, A. M., in 'Production of Precious Metals in U. S.'; Report of Director of Mint, 1884, p. 175, 1885.
[3] Recalculated to 'commercial' from 'coining value' as originally published.
[4] See under 'Unapportioned.'
[5] The metal contained in the 1919 product was 38% iridium and 62% platinum.
[6] No county segregated figures for gold and silver available for years earlier than 1880.
[7] Flasks of 76½ pounds previous to June, 1904; of 75 pounds thence, through 1927; of 76 pounds since January, 1928.

RINITY COUNTY, 1875-1943—Continued

Platinum		Miscellaneous stone[1], value	Miscellaneous and unapportioned		
Ounces	Value		Amount	Value	Substance
19	$473	$17,160	295 lbs.	$8	Lead.
			-------------	12,729	Coal, quicksilver.
[4]	[4]	2,375	-------------	10,509	Coal, lead, platinum, quicksilver.
[4]	[4]	62,522	359 lbs.	29	Copper.
			-------------	11,748	Coal, platinum, quicksilver.
[4]	[4]	3,803	-------------	11,090	Coal, copper, lead, quicksilver.
[4]	[4]	7,867	-------------	5,276	Coal, copper, lead, platinum, quicksilver.
155	7,052	[4]	-------------	8,359	Coal, quicksilver, miscellaneous stone.
[4]	[4]	36,456	-------------	2,339	Coal, platinum.
[4]	------------	16,177	-------------	7,048	Copper, platinum, quicksilver.
[4]	------------	[4]	-------------	37,950	Copper, lead, platinum, quicksilver, miscellaneous stone.
[4]	------------	20,722	-------------	31,365	Chromite, copper, lead, coal, manganese ore, platinum, quicksilver.
[4]	------------	30,885	-------------	173,661	Chromite, copper, lead, iron ore, manganese ore, platinum, quicksilver.
[4]	------------	51,389	-------------	240,555	Chromite, coal, manganese ore, platinum, quicksilver.
[4]682	$43,104	[4]$410,727	-------------	$2,521,989	

MINERAL PRODUCTION OF

Year	Gold, value	Silver, value	Brick		Gems, value	Granite	
			M	Value		Cubic feet	Value
1880	$1,125	$526					
1881	8,181	36					
1882	5,000	2,000					
1883	4,000	1,000					
1884	70,000						
1885	7,500						
1886	6,900	50					
1887	15,640	167					
1888	25,000						
1889	39,340	250					
1890	43,019						
1891	15,095						
1892	24,355	11					
1893	12,818						
1894						4,668	$10,000
1895	16,320					3,000	2,500
1896	20,092					2,800	4,700
1897	12,830	214				3,600	8,000
1898	12,400		300	$2,000		700	1,500
1899	13,610		600	4,200		1,200	3,000
1900	10,445	433	650	6,100		1,500	3,000
1901	14,616	100	1,600	8,600		9,000	18,000
1902	11,648		4,500	27,000	$500	1,790	4,000
1903	9,215		1,500	9,500	500	3,000	2,260
1904	1,100		1,250	10,000		7,000	16,000
1905	2,300	13	2,000	16,000	5,000	7,000	9,000
1906	20		1,500	12,000	209,790	7,000	9,000
1907			2,500	20,000	26,206		
1908			2,250	18,000	62,250		
1909			6,620	42,400	58,000		
1910			8,195	64,000	104,000	700	1,500
1911			10,225	81,000	20,000		
1912			10,900	70,500	5,350		
1913			6,000	45,000	1,500		
1914			6,838	47,507			
1915			5,520	33,364			
1916			6,330	48,500			[1]
1917			6,771	112,938			[1]
1918			[1]		[1]		[1]
1919			and tile	34,978			[1]
1920			[1]				
1921							[1]
1922			[1]				[1]
1923			[1]				[1]
1924			[1]				[1]
1925			[1]				62,260

TULARE COUNTY, 1880-1943

Magnesite		Miscellaneous stone[1], value	Miscellaneous and unapportioned		
Tons	Value		Amount	Value	Substance
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------------	------------	------------	80 tons	$960	Limestone.
------------	------------	------------	1,000 bbls.	1,500	Lime.
------------	------------	------------	------------	------------	
------------	------------	------------	------------	------------	
200	$1,500	------------	22 tons	88	Gypsum.
3,511	28,210	------------	------------	------------	
2,450	19,250	------------	------------	------------	
1,300	19,600	$100	------------	------------	
2,800	9,100	------------	------------	50,108	Unapportioned, 1900-1909.
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------------	------------	------------	------------	------------	
2,380	21,420	------------	400 tons	2,200	Gypsum.
6,567	52,642	------------	------------	------------	
6,468	47,200	------------	2,803 lbs.	360	Copper.
			------------	185	Natural gas.
7,110	35,550	------------	2,000 M cu.ft.	1,000	Natural gas.
7,763	57,335	------------	------------	------------	
6,684	66,840	------------	100 cu. ft.	200	Marble.
7,858	62,864	4,350	80 tons	200	Quartz.
			392 cu. ft.	796	Marble.
			1,429 tons	5,050	Feldspar.
9,650	96,500	1,750	1,250 tons	2,400	Quartz.
			2,830 tons	13,065	Feldspar.
			6 cu. ft.	30	Marble.
11,574	104,166	36,851	1,349 tons	1,888	Limestone.
			1,800 tons	6,500	Feldspar.
			------------	1,830	Chromite and silica.
87,606	737,130	82,255	3,435 tons	42,555	Chromite.
			1,422 lbs.	350	Copper.
			------------	36,410	Feldspar, granite, limestone, marble, silica.
136,562	1,238,853	75,594	450 tons	11,000	Chromite.
			240 tons	1,580	Feldspar.
			------------	60,023	Building tile, copper, graphite, limestone, talc.
28,826	269,748	125,407	600 tons	24,000	Chromite.
			444 tons	2,928	Feldspar.
			8,400 tons	32,400	Limestone.
			204 tons	1,143	Silica.
			------------	71,782	Brick, gems, granite, soapstone, talc, tile.
18,765	186,601	10,811	10,347 tons	46,388	Limestone.
			700 M cu.ft.	295	Natural gas.
			------------	51,928	Chromite, feldspar, granite.
35,305	394,169	8,465	400 M cu.ft.	195	Natural gas.
			------------	190,467	Brick, feldspar, granite, limestone.
11,454	125,594	284,122	10,030 tons	40,090	Limestone.
			380 M cu.ft.	190	Natural gas.
			------------	102,238	Brick and granite.
17,223	181,842	151,000	380 M	190	Natural gas.
			------------	189,662	Brick, tile, granite, limestone.
24,058	298,272	1,990	380 M	190	Natural gas.
			15,500 tons	57,500	Limestone.
			------------	108,607	Brick, granite.
21,203	271,830	80,411	1,080 M	540	Natural gas.
			------------	145,893	Brick, hollow tile, granite, limestone.
18,150	245,557	47,176	280 M	175	Natural gas.
			13,300 tons	43,900	Limestone.
			------------	27,911	Brick, lime.

MINERAL PRODUCTION OF

Year	Gold, value	Silver, value	Brick		Gems, value	Granite	
			M	Value		Cubic feet	Value
1926	-	-	[2]	-	-	-	[2]
1927	-	-	[2]	-	-	-	[2]
1928	-	-	[2]	-	[2]	-	[2]
1929	-	-	[2]	-	-	-	[2]
1930	$36	$311	-	-	[2]	-	[2]
1931	244	2	[2]	-	[2]	-	[2]
1932	141	1	[2]	-	[2]	-	[2]
1933	2,152	14	[2]	-	-	-	[2]
1934	5,114	94	[2]	-	[2]	-	-
1935	952	9	[2]	-	-	-	[2]
1936	840	46	[2]	-	-	-	[2]
1937	1,050	9	[2]	-	[2]	-	[2]
1938	1,400	12	[2]	-	-	-	-
1939	3,255	30	[2]	-	-	-	-
1940	560	5	[2]	-	-	-	-
1941	2,625	40	[2]	-	-	-	-
1942	4,690	41	[2]	-	-	-	-
1943	-	346	[2]	-	-	-	-
Totals	$425,628	$5,760	-	[2]$713,587	[2]$493,096	-	[2]$154,720

Grand total value, $13,280,816.

1 Includes crushed rock, rubble, sand, gravel.
2 See under 'Unapportioned.'

TULARE COUNTY, 1880-1943—Continued

Magnesite		Miscellaneous stone[1], value	Miscellaneous and unapportioned		
Tons	Value		Amount	Value	Substance
			593 tons	$7,709	Lime.
13,378	$138,347	$73,881	18,000 tons	70,000	Limestone.
			----------	107,983	Brick, hollow tile, granite, natural gas.
----------	[2]	15,082	----------	459,091	Brick, hollow tile, granite, lime, limestone, magnesite.
----------	[2]	108,419	----------	336,947	Brick, gems, granite, lime, limestone, magnesite.
----------	[2]	24,932	----------	262,949	Brick, granite, limestone, magnesite.
[2]	----------	74,500	----------	178,297	Gems, granite, limestone, magnesite, petroleum.
[2]	----------	75,778	----------	121,092	Barite, brick and building tile, gems, granite, magnesite, limestone, petroleum.
----------	----------	72,541	----------	43,391	Barite, brick and building tile, copper, gems, granite, lime, petroleum, tungsten.
----------	----------	136,859	----------	39,588	Brick, granite, petroleum, tungsten.
			4,404 lbs.	32	Copper.
----------	----------	139,875	2,697 lbs.	100	Lead.
			----------	39,259	Barite, brick, gems, petroleum, tungsten.
----------	----------	27,607	----------	25,343	Barite, brick, granite, natural gas, petroleum.
----------	----------	174,273	9,276 lbs.	427	Lead.
			----------	34,382	Brick, copper, zinc, granite, natural gas, petroleum.
----------	----------	136,539	----------	177,354	Brick and building tile, chromite, gems, natural gas, petroleum, tungsten ore.
----------	----------	151,788	----------	119,999	Brick and hollow tile, natural gas, petroleum, tungsten ore.
----------	----------	46,983	----------	117,870	Natural gas.
			----------	284,409	Brick and hollow tile, petroleum, tungsten ore.
----------	----------	14,164	----------	205,336	Brick and hollow tile, pottery clay, natural gas, tungsten ore.
----------	----------	101,470	----------	168,526	Barite, brick and hollow tile, natural gas, petroleum, tungsten ore.,
----------	----------	30,298	1,021 units	26,996	Tungsten ore.
			----------	106,718	Brick and hollow tile, manganese ore, natural gas, petroleum.
			5,080 lbs.	381	Lead.
----------	----------	81,188	5,370 units	108,192	Tungsten ore.
			----------	111,185	Brick and hollow tile, manganese ore, natural gas, petroleum.
[2]488,845	$4,710,120	$2,245,459	----------	$4,532,446	

MINERAL PRODUCTION OF

Year	Gold, value	Silver, value	Lime		Limestone	
			Barrels	Value	Tons	Value
1880	$461,861	$1,071				
1881	500,000	1,000				
1882	400,000					
1883	320,000					
1884	310,000					
1885	320,903	1,473				
1886	432,438	1,551				
1887	504,662	3,166				
1888	475,000	3,500				
1889	446,300	543				
1890	1,500,629	13,062				
1891	1,384,950	139				
1892	1,092,549	911				
1893	354,734	1,329				
1894	547,448	1,072				
1895	666,754	313				
1896	1,070,141	328				
1897	1,809,572	1,696				
1898	1,734,953	15,582				
1899	1,635,769	15,111				
1900	1,596,891	62,367				
1901	1,670,368	39,787				
1902	1,791,829	6,580				
1903	1,732,572	13,989	1,600	$1,600		
1904	1,563,907	12,963				
1905	1,291,726	21,348	500	1,000		
1906	1,039,675	8,476	500	1,000		
1907	806,875	6,453	110,000	125,000		
1908	798,752	11,732	60,000	69,500	1,233	$6,500
1909	925,703	4,384	60,000	60,000	15,057	28,942
1910	615,626	5,754	78,300	78,300	3,600	10,400
1911	1,093,484	13,243	75,000	70,000	4,319	13,609
1912	1,113,291	25,146	117,450	121,250	11,554	20,099
1913	974,409	24,381	75,000	85,000	12,446	20,676
1914	940,793	12,017	63,331	38,000	16,707	21,907
1915	1,058,103	13,480	[7]		8,859	11,349
1916	868,237	17,039	[7]		3,137	5,132
1917	321,085	7,808	[7]		3,287	6,481
1918	274,328	21,425	[7]		3,064	5,600
1919	471,021	11,076	[7]		[3]	
1920	254,569	6,007	[7]		7,494	15,288
1921	96,026	2,505	[7]		3,650	9,475
1922	222,366	2,976				
1923	261,936	2,801			3,140	7,680
1924	255,994	1,106			8,515	19,983
1925	155,592	614				[4]268,000
1926	119,873	1,119				
1927	40,209	302			[7]	
1928	36,807	185	[7]		[7]	
1929	70,957	2,735	[7]		[7]	

TUOLUMNE COUNTY, 1880-1943

Marble		Copper		Miscellaneous stone*, value	Miscellaneous and unapportioned[7]		
Cubic feet	Value	Pounds	Value		Amount	Value	Substance
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---------	---------	---------	---------	---------	800 M	$2,288	Brick.
---------	---------	---------	---------	---------	---------	1,301	Unapportioned, 1900-1909.
---------	---------	---------	---------	---------	400 lbs.	16	Lead.
7,000	$14,000	155,826	$17,920	---------	---------	---------	
11,550	28,875	---------	---------	---------	10,367 cu. ft.	14,020	Granite.
11,500	28,750	---------	---------	---------	9,700 cu. ft.	9,700	Granite.
11,000	66,000	---------	---------	---------	9,700 cu. ft.	9,700	Granite.
23,000	46,000	---------	---------	---------	9,700 cu. ft. 197 tons	9,700 1,379	Granite. Chromite.
22,030	60,120	---------	---------	---------	---------	---------	
18,503	47,165	140,000	---------	---------	---------	---------	
27,600	107,400	9,086	1,154	---------	30 tons	180	Chromite.
17,360	45,400	---------	---------	---------	2,052 lbs.	111	Lead.
18,966	50,398	---------	---------	---------	---------	---------	
27,720	73,920	---------	---------	---------	---------	---------	
37,312	93,726	893	138	---------	893 lbs.	53	Lead.
21,830	38,202	45	6	---------	89 lbs.	3	Lead.
[7]	---------	27,667	4,842	$1,900	352 tons 1,779 lbs. ---------	2,352 84 79,328	Chromite. Lead. Dolomite, lime, marble.
[7]	---------	1,797	442	1,500	285 tons 873 lbs. ---------	4,556 60 107,296	Chromite. Lead. Dolomite, lime, magnesite, marble.
[7]	---------	32,840	8,960	3,800	2,680 tons 997 lbs. ---------	54,290 86 108,758	Chromite. Lead. Dolomite, lime, magnesite, marble.
[7]	---------	35,127	8,676	1,700	4,269 tons ---------	168,693 121,806	Chromite. Lime, manganese, marble.
[7]	---------	[7]	---------	2,700	--------- ---------	110,746 78,950	Lime and limestone. Chromite, copper, granite, marble.
[7]	---------	---------	---------	28,696	---------	209,354	Dolomite, lime, marble, platinum.
[7]	---------	---------	---------	229,185	---------	217,292	Dolomite, granite, lime, marble.
---------	---------	---------	---------	246,460	---------	293,136	Other minerals.[1]
---------	---------	---------	---------	9,800	---------	388,145	Other minerals.[2]
---------	---------	---------	---------	12,500	---------	339,573	Other minerals.[3]
---------	---------	---------	---------	29,751	---------	113,305	Other minerals.[5]
---------	---------	2,332	326	56,097	---------	438,583	Other minerals.[6]
[7]	---------	---------	---------	31,416	---------	360,489	Limestone, marble, slate.
[7]	---------	---------	---------	9,090	---------	330,196	Dolomite, lime, limestone, marble, pumice, slate.
[7]	---------	82,383	14,499	11,415	---------	271,914	Dolomite, lead, lime, limestone, marble, slate.

MINERAL PRODUCTION OF

Year	Gold, value	Silver, value	Lime		Limestone	
			Barrels	Value	Tons	Value
1930	$67,691	$300	[7]		[7]	
1931	77,902	180	[7]		[7]	
1932	93,939	214	[7]		[7]	
1933	107,736	280	[7]		[7]	
1934	269,256	1,147	[7]		[7]	
1935	286,062	1,979	[7]		[7]	
1936	476,105	3,028	[7]		[7]	
1937	690,585	6,155	[7]		[7]	
1938	854,490	4,544	[7]		[7]	
1939	422,240	2,059	[7]		[7]	
1940	767,620	3,496	[7]		19,904	$46,122
1941	804,895	4,107	[7]		[7]	
1942	443,555	2,575			[7]	
1943	363,965	2,560			[7]	
Totals	$44,157,708	$454,269	[7]641,681	$650,650	[7]125,966	$527,243

Grand total value, $54,765,796.

* Includes crushed rock, macadam, rubble, sand, gravel.
1 Includes mineral paint and sandstone.
2 Includes granite, lime, magnesite, marble.
3 Includes clay, dolomite, granite, lime, marble.
4 Includes lime.
5 Includes dolomite, granite, marble.
6 Includes granite, lead, lime, limestone, magnesite, marble, silica
7 See under 'Unapportioned.'

TUOLUMNE COUNTY, 1880-1943—Continued

Marble		Copper		Miscellaneous stone*, value	Miscellaneous and unapportioned[7]		
Cubic feet	Value	Pounds	Value		Amount	Value	Substance
[7]	----------	4,566	$593	[7]	317 lbs.	$16	Lead.
					----------	249,722	Lime, limestone, marble, slate, miscellaneous stone.
[7]	----------	[7]	----------	100,785	----------	198,290	Chromite, copper, lime, limestone, marble, slate, soapstone.
[7]	----------	----------	----------	87,814	----------	118,491	Chromite, lime, limestone, marble, slate, soapstone.
[7]	----------	----------	----------	11,020	----------	145,943	Chromite, lime, limestone, marble, slate.
[7]	----------	----------	----------	5,578	----------	147,607	Chromite, lime, limestone, marble, slate.
[7]	----------	[7]	----------	39,350	----------	147,219	Copper, lead, lime, limestone, marble, slate.
[7]	----------	10,082	927	71,968	----------	171,441	Lead, lime, limestone, marble, slate.
[7]	----------	6,157	745	130,747	----------	183,948	Lead, lime, limestone, marble, slate.
----------	----------	2,899	285	84,568	----------	186,377	Granite, lead, lime, limestone, slate.
[7]	----------	9,860	1,025	25,277	----------	219,243	Chromite, dolomite, lead, granite, lime, limestone, marble, platinum, slate.
[7]	----------	4,649	525	60,620	----------	154,194	Lead, lime, marble, slate, soapstone.
[7]	----------	9,177	1,083	132,318	----------	200,502	Chromite, lead, dolomite, lime, limestone, magnesite, marble, slate.
----------	----------	4,555	551	110,390	----------	289,509	Chromite, dolomite, limestone, tungsten ore.
----------	----------	4,933	641	67,067	----------	349,275	Chromite, dolomite, limestone.
[7]255,371	$699,756	[7]404,874	$63,343	[7]$1,603,557	----------	$6,609,270	

MINERAL PRODUCTION OF

Year	Gold, value	Petroleum		Natural gas		Asphalt and bituminous brick		Brick	
		Barrels	Value	M Cu. Ft.	Value	Tons	Value	M	Value
1880	$354	[2]							
1881	600								
1882									
1883									
1884									
1885									
1886									
1887									
1888									
1889									
1890	2,468								
1891	1,715								
1892									
1893									
1894		290,913	$367,822			248	$4,800		
1895		244,624	244,624			175	3,500		
1896		248,000	272,800						
1897		368,282	368,282						
1898		427,000	571,000			4,105	80,775	286	$2,228
1899	3,990	496,200	496,200			5,188	103,760	375	3,000
1900	2,562	443,000	398,700			1,466	31,670	230	1,700
1901	4,183	472,057	236,028			2,073	30,945		
1902	2,012	475,000	455,000			37	370		
1903	1,087	542,902	517,611			1,114	13,368	1,380	12,900
1904	2,700	518,000	465,682	1,800	$2,700	3,169	38,028		
1905	1,200	375,522	236,578	3,831	5,000	3,000	30,000	1,300	10,400
1906	[3]	311,000	155,500	3,500	1,000	3,700	37,000	1,675	11,650
1907		352,224	211,334	1,825	2,278			1,600	12,800
1908		289,625	217,219	3,625	4,531			200	1,500
1909		344,419	223,872	1,721	2,151			1,275	7,625
1910		492,147	319,898	545	681			1,190	36,945
1911		499,082	349,777	[4]29,580	2,958			900	5,100
1912		662,300	584,811	[4]55,068	4,163			550	3,575
1913		899,007	907,997	62,200	6,220			1,023	6,085
1914		943,929	991,125	100,000	6,000			449	3,102
1915		1,017,220	869,723	491,879	29,670			200	2,500
1916		943,499	985,956	806,540	133,867			[3]	
1917		996,501	1,313,388	1,033,564	152,550			[3]	
1918		1,339,342	1,982,226	858,457	150,885				
1919		1,685,073	2,755,094	1,038,574	252,240			[3]	
1920		1,989,681	4,988,130	1,521,448	214,280				
1921		2,167,326	5,869,119	2,127,476	360,443			[3]	
1922		2,933,685	5,236,628	3,583,818	536,502				
1923		3,610,794	4,109,084	4,162,318	470,261				
1924		3,958,010	5,279,985	5,995,760	633,352				
1925		9,221,846	15,769,357	20,144,646	1,953,163				
1926		16,994,275	25,695,344	41,559,144	4,080,040				
1927		19,996,841	23,536,282	71,036,201	6,951,273				31,832
1928		22,143,318	24,311,149	67,058,513	6,196,549			[3]	
1929	473	24,003,969	27,602,164	77,293,145	5,812,729			[3]	
1930	221	19,983,341	27,896,744	54,741,670	3,749,829			[3]	
1931	293	17,245,113	13,297,707	53,643,509	1,875,264				
1932	887	14,401,476	12,277,793	40,432,752	2,393,920				
1933	1,193	14,793,286	12,398,253	39,539,382	1,957,634				

VENTURA COUNTY, 1880-1943

Pottery clay		Sandstone		Miscellaneous stone[1], value	Miscellaneous and unapportioned		
Tons	Value	Cubic feet	Value		Amount	Value	Substance
---------	---------	---------	---------	---------	---------	---------	
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---------	---------	16,200	$16,500	---------	---------	---------	
---------	---------	33,200	20,000	---------	---------	---------	
---------	---------	---------	---------	---------	---------	---------	
---------	---------	---------	---------	---------	---------	---------	
---------	---------	---------	---------	---------	250 tons	$6,500	Borax.
---------	---------	12,500	6,250	$35,279	---------	---------	
---------	---------	4,200	2,650	16,764	3,000 tons ---------	60,000 4	Borax. Silver.
---------	---------	3,200	1,600	22,500	50 tons	2,500	Mica.
---------	---------	1,750	900	25,100	3,500 tons 50 tons	140,000 3,800	Borax. Mica.
---------	---------	6,000	3,500	31,227	50 tons	3,000	Mica.
30	$45	2,300	1,380	60,490	---------	---------	
---------	---------	1,320	792	---------	---------	---------	
---------	---------	---------	---------	20,880	---------	---------	
560	1,680	---------	---------	15,406	---------	---------	
---------	---------	---------	---------	144,226	---------	830,853	Unapportioned, 1900-1909.
---------	---------	900	450	35,000	---------	---------	
1,900	1,900	4,658	2,325	750	---------	---------	
1,000	1,000	4,600	1,850	---------	---------	---------	
3,000	2,990	300	150	---------	---------	1,530	Unapportioned.
---------	---------	1,195	502	---------	---------	---------	
---------	---------	---------	---------	2,674	---------	200	Other minerals.
[3]	---------	[3]	---------	14,200	---------	1,407	Brick, clay, sandstone.
[3]	---------	[3]	---------	30,000	---------	2,072	Brick and sandstone.
---------	---------	[3]	---------	52,900	---------	300	Other minerals.
[3]	---------	[3]	---------	5,000	---------	4,500 190	Clay and clay products. Other minerals.
[3]	---------	[3]	---------	25,265	---------	500	Mineral paint and sandstone.
---------	---------	---------	---------	11,250	---------	3,985 472	Clay and clay products. Mineral paint and sandstone.
---------	---------	---------	---------	62,888	---------	1,060	Mineral paint and sandstone.
---------	---------	---------	---------	88,211	---------	12,128	Mineral paint and sandstone.
---------	---------	[3]	---------	173,337	---------	2,720	Limestone.
---------	---------	---------	---------	131,200	---------	---------	
373,000	93,250	---------	---------	339,435	---------	300	Other minerals.
354,418	63,120	---------	---------	412,872	---------	---------	
238,914	238,910	---------	---------	332,195	---------	37,872	Brick, building tile and granite.
232,886	197,152	---------	---------	255,183	--------- --------- 6 oz. ---------	76,795 13,500 3 55,900	Brick and building tile. Granite (flagstone). Silver. Unapportioned.
[3]	---------	---------	---------	180,322	5 oz. ---------	2 124,934	Silver. Brick, pottery clay, granite, limestone (shells).
61,300	17,418	---------	---------	184,483	9 fine ozs. ---------	3 80,559	Silver. Brick and hollow building tile, granite (flagstone), limestone (marl).
9,774	1,683	---------	---------	144,515	16 fine ozs. ---------	5 36,803	Silver. Brick and hollow building tile, granite (flagstone), limestone (marl), sandstone.
[3]	---------	---------	---------	164,999	1,631 lbs. 54 fine ozs. ---------	64 19 35,534	Lead. Silver. Brick, clay (pottery), granite, limestone (marl).

MINERAL PRODUCTION OF

Year	Gold, value	Petroleum		Natural gas		Asphalt and bituminous brick		Brick	
		Barrels	Value	M Cu. Ft.	Value	Tons	Value	M	Value
1934	$4,435	12,007,550	$11,331,335	40,767,122	$2,032,849	----------	----------	----------	----------
1935	6,783	13,333,298	12,016,509	39,278,994	2,036,287	----------	----------	[3]	----------
1936	2,345	15,569,523	15,118,061	40,545,785	2,125,746	----------	----------	[3]	----------
1937	1,295	16,720,713	17,562,688	44,102,839	1,457,709	----------	----------	----------	----------
1938	665	16,979,962	18,707,689	43,239,220	2,900,127	----------	----------	----------	----------
1939	[3]	16,866,086	18,530,769	41,098,418	2,038,936	----------	----------	----------	----------
1940	1,540	17,038,470	18,525,316	38,081,099	1,982,242	----------	----------	----------	----------
1941	665	19,431,322	19,221,193	38,608,979	1,913,657	----------	----------	----------	----------
1942	----------	17,853,644	20,148,305	37,911,597	2,180,252	----------	----------	----------	----------
1943	----------	20,279,921	22,400,750	43,133,041	2,247,380	----------	----------	----------	----------
Totals	$43,666	355,260,318	$398,289,301	894,099,585	$58,857,318	24,275	$374,216	----------	$152,942

Grand total value, $466,227,715.

1 Includes crushed rock, rubble, sand, gravel.
2 Commercial production of petroleum in Ventura County began at least as early as 1874, in the Sulphur Mountain district, but detailed county segregations are not available for the early years.
3 See under 'Unapportioned.'
4 Quantity estimated, as only values given in reports of those years.

VENTURA COUNTY, 1880-1943—Continued

Pottery clay		Sandstone		Miscel-laneous stone[1], value	Miscellaneous and unapportioned		
Tons	Value	Cubic feet	Value		Amount	Value	Substance
[3]	----------	----------	----------	$291,845	10 fine ozs.	$6	Silver.
					------------	28,279	Brick and hollow building tile, clay (pottery and oil well drilling), granite, limestone (marl).
[3]	----------	----------	----------	166,553	------------	32	Silver.
					------------	10,782	Brick, pottery clay, copper, granite (tuff).
[3]	----------	----------	----------	361,916	------------	3	Silver.
					------------	23,809	Brick, oil-2311 drilling mud.
[3]	----------	----------	----------	200,861	------------	2	Silver.
					------------	8,165	Oil-well drilling mud, granite (tuff).
[3]	----------	----------	----------	256,199	------------	3	Silver.
					------------	11,733	Clay (pottery) and drilling mud, granite (tuff).
[3]	----------	----------	----------	179,844	------------	23,665	Clay (pottery and drilling mud), gold, granite (tuff), silver.
[3]	----------	----------	----------	128,244	------------	5	Silver.
					------------	10,534	Oil-well drilling mud, granite (tuff).
----------	----------	----------	----------	204,368	------------	4	Silver.
					------------	92,668	Oil-well drilling mud, gypsum, sandstone.
[3]	----------	----------	----------	565,218	------------	190,598	Clay (oil-well drilling), granite (tuff), gypsum, limestone.
[3]	----------	----------	----------	252,385	------------	180,461	Clay (oil-well drilling), gypsum, limestone.
[3]1,276,782	$703,856	[3]92,323	$58,849	$5,626,804	------------	$2,120,763	

MINERAL PRODUCTION OF YOLO COUNTY, 1873-1943

Year	Quicksilver		Sandstone		Miscellaneous stone[1], value	Miscellaneous and unapportioned		
	Flasks	Value	Cubic feet	Value		Amount	Value	Substance
1873	[2]995	$79,928						
1874	3,000	315,540						
1875								
1876	965	42,460						
1877	1,516	56,547						
1878	1,640	53,956						
1879	1,110	33,134						
1880	422	13,082						
1881								
1894			2,500	$1,000				
1895			542	1,873				
1896			252	378				
1897								
1898			264	384				
1899			264	384				
1900			908	1,760				
1901			1,540	2,300				
1902			328	450				
1903			280	144				
1904			180	720				
1905			175	200				
1906			160	204				
1907			250	350				
1908			140	1,150				
1909								
1910								
1911								
1912								
1913								
1914	15	736						
1915	[3]				$1,200		$840	Other minerals.
1916					300			
1917	[3]				4,300		1,261	Other minerals.
1918	[3]				17,915		3,300	Other minerals.
1919	[3]				5,600		19,866	Other minerals.
1920					9,472			
1921					14,829			
1922					[3]		13,431	Unapportioned.
1923					[3]		16,957	Unapportioned..
1924					[3]		15,800	Unapportioned.
1925					23,060			
1926					20,560			
1927					17,895			
1928					17,200			
1929					14,400			
1930					2,700			
1931					21,500			
1932					21,625			
1933					16,694		129	Gold.
1934					37,850	1 fine oz.	1	Silver.
							176	Gold.
1935					33,950		715	Gold.
1936					71,434		175	Other minerals.
1937					40,765		1,330	Gold.
							4	Silver.
							2,072	Other minerals.
1938	[3]				44,598		3,634	Natural gas, quicksilver.
1939	[3]				61,057		2,087	Natural gas, quicksilver.
1940	[3]				24,208		85,612	Natural gas, quicksilver.
1941	[3]				130,085		151,218	Natural gas, quicksilver.
1942	[3]				150,066		467,352	Natural gas, quicksilver.
1943	[3]				38,653		326,523	Natural gas, quicksilver.
Totals	[3]9,663	$595,383	7,783	$11,297	$841,916		$1,111,883	

Grand total value, $2,560,479.

[1] Includes crushed rock, sand, gravel.
[2] Flasks of 76½ pounds, previous to June, 1904; of 75 pounds thence, through 1927; of 76 pounds since January, 1928.
[3] See under 'Unapportioned.'

MINERAL PRODUCTION OF YUBA COUNTY, 1880-1943

Year	Gold, value	Silver, value	Platinum		Miscellaneous stone[1], value	Miscellaneous and unapportioned		
			Ounces	Value		Amount	Value	Substance
1880	$943,860	$438						
1881	800,000	1,300						
1882	750,000							
1883	455,000							
1884	250,000							
1885	207,449							
1886	149,203							
1887	162,426							
1888	150,000							
1889	112,053	115						
1890	141,781							
1891	37,576							
1892	44,218							
1893	30,839							
1894	107,480							
1895	111,482							
1896	171,688							
1897	141,638							
1898	166,865							
1899	189,927	12						
1900	280,366	[2]2,041						
1901	188,908	[2]393						
1902	155,630	2						
1903	125,830	41						
1904	139,528					400 M	$3,000	Brick.
						375 tons,	750	Pottery clay.
1905	324,135	369				400 tons,	80	Pottery clay.
						2,000 gals.	800	Mineral water.
1906	[3]	[3]				2,000 gals.	800	Mineral water.
1907	1,766,770	6,167				1,800 gals.	720	Mineral water.
1908	2,034,486	9,997			$5,570	1,000 M	10,000	Brick.
1909	2,469,865	4,156			5,650	550 M	6,600	Brick.
							568,564	Unapportioned, 1900-1909.
1910	3,204,273	5,372						
1911	2,997,072	5,299			9,318			
1912	2,753,408	6,198			15,526			
1913	2,491,505	7,571			8,063			
1914	2,800,713	5,295	74	$2,377	14,895			
1915	2,703,710	5,254	132	4,174	149,292			
1916	3,167,723	5,934	314	14,301	42,685	4,817 lbs.	1,185	Copper.
							6,000	Other minerals.
1917	3,667,673	6,591	149	8,869	28,863			
1918	3,767,933	13,796	189	12,930	43,338		6,888	Other minerals.
1919	4,195,732	12,276	[4]125	13,098	40,439			
1920	3,467,769	16,502	113	14,395	74,943		40	Other minerals.
1921	4,738,248	26,135	179	14,396	73,387		100	Other minerals.
1922	2,492,948	8,222	115	11,077	75,969		100	Other minerals.
1923	3,150,405	6,760	158	16,974	216,890		100	Other minerals.
1924	1,995,434	4,461	73	8,773	181,113		100	Other minerals.
1925	2,570,630	6,400	[3]		137,288		7,276	Natural gas, platinum.
1926	2,769,703	6,398	[3]		133,298		11,695	Natural gas, platinum.
1927	3,468,201	6,743			198,688		6,000	Other minerals.
1928	2,304,377	4,910	[3]		202,708		17,081	Other minerals.
1929	1,456,039	2,648	[3]		364,326		7,358	Other minerals.
1930	968,814	1,255			[3]		48,330	Other minerals.
1931	991,976	970	[3]		[3]		29,880	Platinum and miscellaneous stone.
1932	960,749	915			27,485			
1933	1,117,844	1,179			31,930		9	Unapportioned.
1934	1,911,960	2,938	[3]		31,099		5,049	Other minerals.
1935	1,806,355	2,696			32,163		7	Other minerals.
1936	2,847,530	3,460	[3]		37,922		4,911	Copper, platinum.
1937	2,495,155	3,666			85,695		2,272	Other minerals.
1938	2,461,935	5,397			163,628		2,178	Other minerals.
1939	3,037,965	6,224			147,780		87	Other minerals.
1940	3,885,875	7,345			134,819		7,575	Other minerals.
1941	3,112,305	3,895			146,038		3,749	Other minerals.
1942	2,645,825	3,627	[3]		589,034		6,285	Other minerals.
1943	1,340,010	1,221	[3]		385,407		8,032	Other minerals.
Totals	$102,356,797	$232,584	[3]1,621	$121,364	$3,835,429		$773,601	

Grand total value, $107,319,775

[1] Includes crushed rock, sand, gravel.
[2] Recalculated to 'commercial' from 'coining value' as originally published.
[3] See under 'Unapportioned.'
[4] Includes some palladium.

COUNTY TOTALS RECORDED, TO AND INCLUDING 1943

Alameda	$88,460,889	San Benito	$56,059,851
Alpine	366,260	San Bernardino	396,303,220
Amador	151,423,540	San Diego	39,692,755
Butte	75,933,659	San Francisco	8,498,750
Calaveras	123,650,158	San Joaquin	24,289,768
Colusa	4,062,741	San Luis Obispo	13,780,988
Contra Costa	68,729,657	San Mateo	50,964,995
Del Norte	4,661,799	Santa Barbara	290,886,188
El Dorado	42,906,813	Santa Clara	104,391,786
Fresno	541,163,821	Santa Cruz	94,310,635
Glenn	3,556,188	Shasta	201,007,676
Humboldt	11,801,243	Sierra	53,446,695
Imperial	10,248,333	Siskiyou	47,356,154
Inyo	103,656,778	Solano	59,244,342
Kern	1,913,506,389	Sonoma	19,228,471
Kings	229,559,090	Stanislaus	19,298,003
Lake	20,553,823	Sutter	548,800
Lassen	2,540,650	Tehama	1,567,877
Los Angeles	2,897,799,920	Trinity	47,572,471
Madera	15,244,317	Tulare	13,280,816
Marin	13,426,367	Tuolumne	54,765,796
Mariposa	28,146,517	Ventura	466,227,715
Mendocino	1,816,033	Yolo	2,560,479
Merced	28,137,579	Yuba	107,319,775
Modoc	1,441,172		
Mono	32,849,118		$10,148,252,483
Monterey	9,875,750		
Napa	42,774,753	Gold, 1848-1879 (inc.)	1,026,679,960
Nevada	236,146,097	Production prior to 1887 of minerals not segregated by counties	14,557,210
Orange	871,998,307		
Placer	59,908,684		
Plumas	81,898,958	Grand total recorded, all minerals 1848-1943 (inc.)	$11,189,489,653
Riverside	129,772,672		
Sacramento	127,630,402		

APPENDIX C.

PUBLIC RESOURCES CODE

An act to establish a Public Resources Code, thereby consolidating and revising the law relating to natural resources, the conservation, utilization, and supervision thereof, and matters incidental thereto, and to repeal certain acts and parts of acts specified herein.

Chapter 93 (Stats. 1939.)

The people of the State of California do enact as follows:

GENERAL PROVISIONS

1. This act shall be known as the Public Resources Code.

2. The provisions of this code, in so far as they are substantially the same as existing provisions relating to the same subject matter shall be construed as restatements and continuations thereof and not as new enactments.

3. All persons who, at the time this code goes into effect, hold office under any of the acts repealed by this code, which offices are continued by this code, continue to hold the same according to the former tenure thereof.

4. No action or proceeding commenced before this code takes effect, and no right accrued, is affected by the provisions of this code, but all procedure thereafter taken therein shall conform to the provisions of this code so far as possible.

5. Unless the context otherwise requires, the general provisions hereinafter set forth shall govern the construction of this code.

6. Division, part, chapter, article, and section headings contained herein shall not be deemed to govern, limit, modify or in any manner affect the scope, meaning, or intent of the provisions of any division, part, chapter, article, or section hereof.

7. Whenever, by the provisions of this code, an administrative power is granted to a public officer or a duty imposed upon such officer, the power may be exercised or the duty performed by a deputy of the officer or by a person authorized pursuant to law.

8. Writing includes any form of recorded message capable of comprehension by ordinary visual means. Whenever any notice, report, statement or record is required by this code, it shall be made in writing in the English language.

9. Whenever any reference is made to any portion of this code or of any other law of this State, such reference shall apply to all amendments and additions thereto now or hereafter made.

10. "Section" means a section of this code unless some other statute is specifically mentioned.

11. The present tense includes the past and future tenses; and the future the present.

12. The masculine gender includes the feminine and neuter.

13. The singular number includes the plural, and the plural the singular.

14. "County" includes "city and county."

15. "Shall" is mandatory and "may" is permissive.

16. "Oath" includes affirmation.

17. "Signature" or "subscription" includes mark when the signer or subscriber can not write, such signer's or subscriber's name being written near the mark by a witness who writes his own name near the signer's or subscriber's name; but a signature or subscription by mark can be acknowledged or can serve as a signature or subscription to a sworn statement only when two witnesses so sign their own names thereto.

18. If any provision of this code, or the application thereof to any person or circumstances, is held invalid the remainder of the code, and the application of its provisions to the other persons or circumstances, shall not be affected thereby.

DIVISION 1. THE DEPARTMENT OF NATURAL RESOURCES

501. There is in the State government a Department of Natural Resources. The department shall be conducted under the control of an executive officer known as the Director of Natural Resources. The director shall be appointed by and hold office at the pleasure of the Governor and shall receive a salary of six thousand dollars a year.

502. Except as in this division otherwise provided, the provisions of Article 2, Chapter 3, Title 1, Part 3 of the Political Code shall govern and apply to the conduct of the Department of Natural Resources in every respect the same as if such provisions were herein set forth at length, and wherever in that article the term "head of the department" or similar designation occurs, it shall for the purposes of this division mean the Director of Natural Resources.

503. For the purposes of administration the department shall be organized by the director, subject to the approval of the Governor, in such manner as he deems necessary properly to segregate and conduct the work of the department. The director may appoint, in accordance with the civil service and other provisions of law, such deputies, officers, and other expert and clerical assistants as may be necessary.

504. The work of the department shall be divided into at least four divisions, known as Division of Forestry, the Division of Parks, The Division of Fish and Game, and The Division of Mines.

505. The Division of Forestry shall be administered through a chief who shall be known as the State Forester. He shall be a technically trained forester, appointed by the director upon nomination by the State Board of Forestry. General policies for the guidance of the Division of Forestry shall be determined by a State Board of Forestry which shall consist of seven members appointed by and holding office at the pleasure of the Governor. Of the seven members one shall be familiar with the pine timber industry, one with the redwood industry, one with live stock industry, one with general agriculture, and one with the problems of water conservation.

506. The Division of Parks shall be administered through a chief who shall be appointed by the director upon nomination by the State Park Commission. General policies for the administration of the State park system shall be determined by the State Park Commission which shall consist of five members appointed by and holding office at the pleasure of the Governor.

507. The Division of Mines shall be administered through a chief who shall be known as the State Mineralogist. He shall be a technically trained mining engineer, appointed by the director upon nomination by the State Mining Board. General policies for the guidance of the Division of Mines shall be determined by a State Mining Board, which shall consist of five members appointed by and holding office at the pleasure of the Governor.

508. The Division of the Department of Natural Resources for the supervision of oil and gas shall be in charge of a chief, known as the State Oil and Gas Supervisor.

509. The salaries of the chiefs of the Divisions of Forestry and Parks shall be fixed by the director with the approval of the Governor. The director and the chief of each division, before entering upon his duties, shall execute and deliver to the State an official bond in the sum of twenty-five thousand dollars conditioned upon the faithful performance of his duties.

510. The members of the Board of Forestry and the State Park Commission shall serve without compensation, but shall be entitled to their actual necessary expenses incurred in the performance of their duties.

511. For the purpose of disseminating information relating to the activities, powers, duties, or functions of the Department of Natural Resources, the department, with the approval of the Department of Finance, may issue publications, construct and maintain exhibits, and perform such acts and carry on such functions as in the opinion of the Director of Natural Resources will best tend to disseminate such information.

Such publications may be distributed free of charge to public libraries and to other State departments and State officers. The department may exchange copies with contemporary publications.

All money received by the department from the sale of publications, exclusive of money received by any separate division of the department from the sale of publications, shall be paid into the State Treasury to the credit of the Department of Natural Resources Printing Revolving Fund, which fund is continued in existence,

and which fund is appropriated for the use of the department, in addition to such other funds as may be appropriated, for the printing and distribution of any publication pertaining to the activities of the department.

(Added by Stats. 1939, Ch. 95, as part of codification.)

512. The Department of Natural Resources may expend the money in any appropriation or in any special fund in the State treasury made available by law for the administration of the statutes the administration of which is committed to the department, or for the use, support, or maintenance of any board, bureau, commission, department, office, or officer whose duties, powers, and functions have been transferred to and conferred upon the department. Such expenditures by the department shall be made in accordance with law in carrying out the purposes for which the appropriations were made or the special funds created.

513. The department shall have possession and control of all records, books, papers, offices, equipment, supplies, moneys, funds, appropriations, land and other property, real or personal held for the benefit or use of all bodies, offices, and officers whose duties, powers, and functions have been transferred to and conferred upon the department.

514. Nothing in this code is intended to supersede, modify or change the effect of the enactment of section 373g of the Political Code, and wherever in this code reference is made to any officer or agency of the Department of Natural Resources, it is made in the sense and with the same legal effect as was attributed thereto in the statute whence derived and which would continue to be so attributable but for the adoption of this code.

DIVISION 2. MINES AND MINING

Chapter 1. Definitions

2001. Unless the context otherwise requires, the definitions hereinafter set forth shall govern the construction of Division 2 of this code.

2002. "Department" in reference to the government of this State, means the Department of Natural Resources.

2003. "Division" in reference to the government of this State, means the Division of Mines in the Department of Natural Resources.

2004. "Person" includes any individual, firm, association, corporation, or any other group or combination acting as a unit.

Chapter 2. The Division of Mines

2200. For the purposes of this chapter "mine" includes all mineral bearing properties of whatever kind or character, whether underground, quarry, pit, well, spring or other source from which any mineral substance is or may be obtained. "Mineral" for the purposes of this chapter includes all mineral products both metallic and nonmetallic, solid, liquid or gaseous, and mineral waters of whatever kind or character.

2201. The State Mineralogist shall employ competent geologists, field assistants, qualified specialists, and office employees when necessary in the execution of the plans and operations of the division under this chapter and shall fix their compensation.

2202. The State Mineralogist shall maintain offices, and a museum, library, and laboratory in San Francisco for the purposes provided in this chapter.

2203. The State Mineralogist shall make a biennial report to the Governor on or before the fifteenth day of September next preceding the regular session of the Legislature.

2204. The State Mineralogist may receive on behalf of this State, for the use and benefit of the division, gifts, bequests, devices, and legacies of real or other property and may use the same in accordance with the wishes of the donors. If no instructions are given by the donors, the State Mineralogist shall manage, use, and dispose of the gifts, bequests, and legacies for the best interests of the division and in such manner as he may deem proper.

2205. The State Mineralogist shall:

(a) Make, facilitate, and encourage special studies of the mineral resources and mineral industries of the State.

(b) Collect statistics concerning the occurrence and production of the economically important minerals and the methods pursued in making their valuable constituents available for commercial use.

(c) Make a collection of typical geological and mineralogical specimens, especially those of economic and commercial importance such collection constituting the museum of the division.

(d) Provide a library of books, reports, and drawings bearing upon the mineral industries, the sciences of mineralogy and geology, and the arts of mining and metallurgy, such library constituting the library of the division.

(e) Make a collection of models, drawings, and descriptions of the mechanical appliances used in mining and metallurgical processes.

(f) Preserve and so maintain such collections and library as to make them available for reference and examination, and open to public inspection at reasonable hours.

(g) Maintain, in effect, a bureau of information concerning the mineral industry of this State to consist of such collections and library, and arrange, classify, catalogue, and index the data therein contained, in a manner to make the information available to those desiring it.

(h) Issue from time to time such bulletins as he may deem advisable concerning the statistics and technology of the mineral industries of this State.

2206. The State Mineralogist may prepare a special collection of ores and minerals of California to be sent to or used at any world's fair or exposition in order to display the mineral wealth of the State.

2207. The owner, lessor, lessee, agent, manager, or other person in charge of any mine of whatever kind or character within the State shall forward to the State Mineralogist, upon his request, at his office, not later than the thirty-first day of March in each year, a detailed report upon forms which will be furnished showing the character of the mine, the number of men employed, the method of working the mine and the general condition thereof, and the total mineral production for the past year. He shall also furnish any additional information relative to such mine that the State Mineralogist may from time to time require for the proper discharge of his official duties. Any such person who fails to comply with the provisions of this section is guilty of a misdemeanor.*

2208. The State Mineralogist or a qualified assistant may at any time enter or examine any and all mines, quarries, wells, mills, reduction works, refining works, and other mineral properties or working plans in this State in order to gather data to comply with the provisions of this chapter.

2209. The State Mineralogist may fix a price upon and dispose of to the public all publications of the division, including reports, bulletins, maps, registers, or other publications. The price shall approximate the cost of publication and distribution. He may also furnish the publications of the division to public libraries wthout cost and may exchange publications with geological surveys, scientific societies, and other like bodies.

2210. All money received by the division from sales of publications issued by the division shall be deposited at least once each month in the State treasury to the credit of the Division of Mines revolving printing fund, which fund is continued in existence. This fund is appropriated for the use of the division, in addition to such other funds as may be appropriated, for the printing and publishing of reports, bulletins, and maps issued by the division. The State Controller may require financial reports from the division or any officer thereof.

(Added by Stats. 1939, Ch. 96, as part of codification.)

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* Sec. 19 of the Penal Code of California provides: "Except in cases where a different punishment is prescribed by this code, every offense declared to be a misdemeanor is punishable by imprisonment in a county jail not exceeding six months, or by a fine not exceeding five hundred dollars, or by both."

Publications of the Division of Mines

PUBLICATIONS OF THE DIVISION OF MINES

During the past sixty-four years, in carrying out the provisions of the organic act creating the former California State Mining Bureau, there have been published many reports, bulletins and maps which go to make up a library of detailed information on the mineral industry of the State, a large part of which could not be duplicated from any other source.

One feature that has added to the popularity of the publications is that many of them have been distributed without cost to the public, and even the more elaborate ones have been sold at a price which barely covers the cost of printing.

Owing to the fact that funds for the advancing of the work of this department have usually been limited, the reports and bulletins mentioned are printed in limited editions many of which are now entirely exhausted.

Copies of such publications are available for reference, however, in the offices of the Division of Mines, in the Ferry Building, San Francisco 11; State Building, Los Angeles 12; State Office Building No. 1, Sacramento 14; Redding; and Division of Oil and Gas at Santa Barbara, Santa Paula, Taft, Bakersfield, Coalinga. They may also be found in many public, private and technical libraries in California and other states and foreign countries.

A catalog of all publications from 1880 to 1917, giving a synopsis of their contents, is issued as Bulletin No. 77.

Publications in stock may be obtained postpaid by addressing the San Francisco, Los Angeles or Sacramento offices and enclosing the requisite amount.

Remittances of stamps in an amount not to exceed 26 cents, currency or coin will be accepted at sender's risk. Payment is preferred in the form of money orders.

Money orders should be made payable to the Division of Mines.

Write for latest revised price list.

NOTE.—The Division of Mines frequently receives requests for some of the early Reports and Bulletins now out of print, and it will be appreciated if parties having such publications and wishing to dispose of them will advise this office.

REPORTS

Asterisks (**) indicate the publication is out of print. Price (including postage and sales tax)

**Report I of the State Mineralogist, 1880, 43 pp. Henry G. Hanks	----
**Report II of the State Mineralogist, 1882, 514 pp., 4 illustrations, 1 map. Henry G. Hanks	----
**Report III of the State Mineralogist, 1883, 111 pp., 21 illustrations. Henry G. Hanks	----
**Report IV of the State Mineralogist, 1884, 410 pp., 7 illustrations. Henry G. Hanks	----
**Report V of the State Mineralogist, 1885, 234 pp., 15 illustrations, 1 geological map. Henry G. Hanks	----
**Report VI of the State Mineralogist, Part 1, 1886, 145 pp., 3 illustrations, 1 map. Henry G. Hanks	----
Part II, 1887, 222 pp., 36 illustrations. William Irelan, Jr. Price $0.75, sales tax $0.02	$0.77
**Report VII of the State Mineralogist, 1887, 315 pp. William Irelan, Jr.	----
**Report VIII of the State Mineralogist, 1888, 948 pp., 122 illustrations. William Irelan, Jr.	----
Report IX of the State Mineralogist, 1889, 352 pp., 57 illustrations, 2 maps. William Irelan, Jr. Price $1.15, sales tax $0.03	1.18
**Report X of the State Mineralogist, 1890, 983 pp., 179 illustrations, 10 maps. William Irelan, Jr.	----
Report XI (First Biennial) of the State Mineralogist, for the two years ending September 15, 1892, 612 pp., 73 illustrations, 4 maps. William Irelan, Jr. Price $1.50, sales tax $0.04	1.54
**Report XII (Second Biennial) of the State Mineralogist, for the two years ending September 15, 1894, 541 pp., 101 illustrations, 5 maps. J. J. Crawford	----
**Report XIII (Third Biennial) of the State Mineralogist, for the two years ending September 15, 1896, 726 pp., 93 illustrations, 1 map. J. J. Crawford	----
Chapters of the State Mineralogist's Report XIV, Biennial Period, 1913-1914, Fletcher Hamilton:	
**Mines and Mineral Resources, Amador, Calaveras and Tuolumne Counties, 172 pp., paper	----
Mines and Mineral Resources, Colusa, Glenn, Lake, Marin, Napa, Solano, Sonoma and Yolo Counties, 208 pp., paper Price $0.50, sales tax $0.01	.51
Mines and Mineral Resources, Del Norte, Humboldt and Mendocino Counties, 59 pp., paper Price $0.35, sales tax $0.01	.36
Mines and Mineral Resources, Fresno, Kern, Kings, Madera, Mariposa, Merced, San Joaquin and Stanislaus Counties, 220 pp., paper Price $0.75, sales tax $0.02	.77
Mines and Mineral Resources of Imperial and San Diego Counties, 113 pp., paper Price $0.50, sales tax $0.01	.51
**Mines and Mineral Resources, Shasta, Siskiyou and Trinity Counties, 180 pp., paper	----
**Report XIV of the State Mineralogist, for the Biennial Period 1913-1914, Fletcher Hamilton, 1915: A General Report on the Mines and Mineral Resources of Amador, Calaveras, Tuolumne, Colusa, Glenn, Lake, Marin, Napa, Solano, Sonoma, Yolo, Del Norte, Humboldt, Mendocino, Fresno, Kern, Kings, Madera, Mariposa, Merced, San Joaquin, Stanislaus, San Diego, Imperial, Shasta, Siskiyou and Trinity Counties, 974 pp., 275 illustrations, cloth	----
Chapters of the State Mineralogist's Report XV, Biennial Period, 1915-1916, Fletcher Hamilton:	

REPORTS—Continued

Asterisks (**) indicate the publication is out of print. — Price (including postage and sales tax)

**Mines and Mineral Resources, Alpine, Inyo and Mono Counties, 176 pp., paper ---- ----

Mines and Mineral Resources, Butte, Lassen, Modoc, Sutter and Tehama Counties, 91 pp., paper----Price $0.50, sales tax $0.01 $0.51

**Mines and Mineral Resources, El Dorado, Placer, Sacramento and Yuba Counties, 198 pp., paper---- ----

**Mines and Mineral Resources, Monterey, San Benito, San Luis Obispo, Santa Barbara and Ventura Counties, 183 pp., paper---- ----

**Mines and Mineral Resources, Los Angeles, Orange and Riverside Counties, 136 pp., paper---- ----

**Mines and Mineral Resources, San Bernardino and Tulare Counties, 186 pp., paper ---- ----

**Report XV of the State Mineralogist, for the Biennial Period 1915-1916, Fletcher Hamilton, 1917:

A General Report on the Mines and Mineral Resources of Alpine, Inyo, Mono, Butte, Lassen, Modoc, Sutter, Tehama, Placer, Sacramento, Yuba, Los Angeles, Orange, Riverside, San Benito, San Luis Obispo, Santa Barbara, Ventura, San Bernardino and Tulare Counties, 990 pp., 413 illustrations, cloth---- ----

Chapters of the State Mineralogist's Report XVI, Biennial Period, 1917-1918, Fletcher Hamilton:

**Mines and Mineral Resources of Nevada County, 270 pp., paper----

Mines and Mineral Resources of Plumas County, 188 pp., paper---- Price $0.50, sales tax $0.01 .51

Mines and Mineral Resources of Sierra County, 144 pp., paper---- Price $0.75, sales tax $0.02 .77

Report XVII of the State Mineralogist, 1920, 'Mining in California during 1920,' Fletcher Hamilton; 562 pp., 71 illustrations, cloth---- Price $2.50, sales tax $0.06 2.56

Report XVIII of the State Mineralogist, 1922, 'Mining in California,' Fletcher Hamilton. Chapters published monthly beginning with January, 1922:

**January, **February, **March, April, May, June, July, August, September, October, November, December, 1922----Price $0.03, sales tax $0.01 .31

Chapters of Report XIX of the State Mineralogist, 'Mining in California,' Fletcher Hamilton and Lloyd L. Root. January, February, March, September, 1923 ----Price $0.30, sales tax $0.01 .31

Chapters of Report XX of the State Mineralogist, 'Mining in California,' Lloyd L. Root. Published quarterly. January, April, July, October, 1924, per copy----Price $0.30, sales tax $0.01 .31

Chapters of Report XXI of the State Mineralogist, 'Mining in California,' Lloyd L. Root. Published quarterly:

January, 1925. Mines and Mineral Resources of Sacramento, Monterey and Orange Counties----Price $0.30, sales tax $0.01 .31

April, 1925. Mines and Mineral Resources of Calaveras, Merced, San Joaquin, Stanislaus and Ventura Counties---- Price $0.30, sales tax $0.01 .31

**July, 1925. Mines and Mineral Resources of Del Norte, Humboldt and San Diego Counties---- ----

**October, 1925. Mines and Mineral Resources of Siskiyou, San Luis Obispo and Santa Barbara Counties---- ----

Chapters of Report XXII of the State Mineralogist, 'Mining in California,' Lloyd L. Root. Published quarterly:

**January, 1926. Mines and Mineral Resources of Trinity and Santa Cruz Counties ---- ----

**April, 1926. Mines and Mineral Resources of Shasta, San Benito and Imperial Counties ---- ----

July, 1926. Mines and Mineral Resources of Marin and Sonoma Counties ----Price $0.30, sales tax $0.01 .31

**October, 1926. Mines and Mineral Resources of El Dorado and Inyo Counties, also report on Minaret District, Madera County---- ----

REPORTS——Continued

Asterisks (**) indicate the publication is out of print. | Price (including postage and sales tax)

Chapters of Report XXIII of the State Mineralogist, 'Mining in California,' Lloyd L. Root. Published quarterly:

January, 1927. Mines and Mineral Resources of Contra Costa County; Santa Catalina Island________________Price $0.30, sales tax $0.01 $0.31

April, 1927. Mines and Mineral Resources of Amador and Solano Counties Price $0.30, sales tax $0.01 .31

**July, 1927. Mines and Mineral Resources of Placer and Los Angeles Counties ________________ --

October, 1927. Mines and Mineral Resources of Mono County__________ Price $0.30, sales tax $0.01 .31

Chapters of Report XXIV of the State Mineralogist, 'Mining in California,' Lloyd L. Root. Published quarterly:

January, 1928. Mines and Mineral Resources of Tuolumne County______ Price $0.30, sales tax $0.01 .31

April, 1928. Mines and Mineral Resources of Mariposa County__________ Price $0.30, sales tax $0.01 .31

**July, 1928. Mines and Mineral Resources of Butte and Tehama Counties ____

October, 1928. Mines and Mineral Resources of Plumas and Madera Counties ________________Price $0.30, sales tax $0.01 .31

Chapters of Report XXV of the State Mineralogist, 'Mining in California,' Walter W. Bradley. Published quarterly:

**January, 1929. Mines and Mineral Resources of Lassen, Modoc and Kern Counties; also on Special Placer Machines________________ ____

**April, 1929. Mines and Mineral Resources of Sierra, Napa, San Francisco and San Mateo Counties________________ ____

July, 1929. Mines and Mineral Resources of Colusa, Fresno and Lake Counties ________________Price $0.30, sales tax $0.01 .31

October, 1929. Mines and Mineral Resources of Glenn, Alameda, Mendocino and Riverside Counties______________Price $0.30, sales tax $0.01 .31

Chapters of Report XXVI of the State Mineralogist, 'Mining in California,' Walter W. Bradley. Published quarterly:

January, 1930. Mines and Mineral Resources of Santa Clara County; also Barite in California________________Price $0.40, sales tax $0.01 .41

**April, 1930. Mines and Mineral Resources of Nevada County; also Mineral Paint Materials in California________________ ____

**July, 1930. Mines and Mineral Resources of Yuba and San Bernardino Counties; also Commercial Grinding Plants in California__________ ____

October, 1930. Mines and Mineral Resources of Butte, Kings and Tulare Counties; also Geology of Southwestern Mono County (Preliminary) Price $0.40, sales tax $0.01 .41

Chapters of Report XXVII of the State Mineralogist, 'Mining in California,' Walter W. Bradley. Published quarterly:

January, 1931. Preliminary Report of Economic Geology of the Shasta Quadrangle. Beryllium and Beryl. The New Tariff and Nonmetallic Products. Crystalline talc. Decorative effects in Concrete_________ Price $0.40, sales tax $0.01 .41

April, 1931. Stratigraphy of the Kreyenhagen Shale. Diatoms and Silicoflagellates of the Kreyenhagen Shale. Foraminifera of the Kreyenhagen Shale. Geology of Santa Cruz Island________________ Price $0.40, sales tax $0.01 .41

**July, 1931. (Yuba, San Bernardino Counties.) Feldspar, Silica, Andalusite and Cyanite Deposits of California. Note on a Deposit of Andalusite in Mono County; its occurrence and chemical importance. Bill creating Trinity and Klamath River Fish and Game District and its effect upon mining ________________ ____

October, 1931. (Alpine County.) Geology of the San Jacinto Quadrangle south of San Gorgonio Pass, California. Notes on Mining Activities in Inyo and Mono Counties in July, 1931________________ Price $0.40, sales tax $0.01 .41

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30′ quadrangle	1:125,000	approximately 1″ =
15′ quadrangle	1:62,500	approximately 1″ =
7½′ quadrangle	1:31,680	approximately 1″ =
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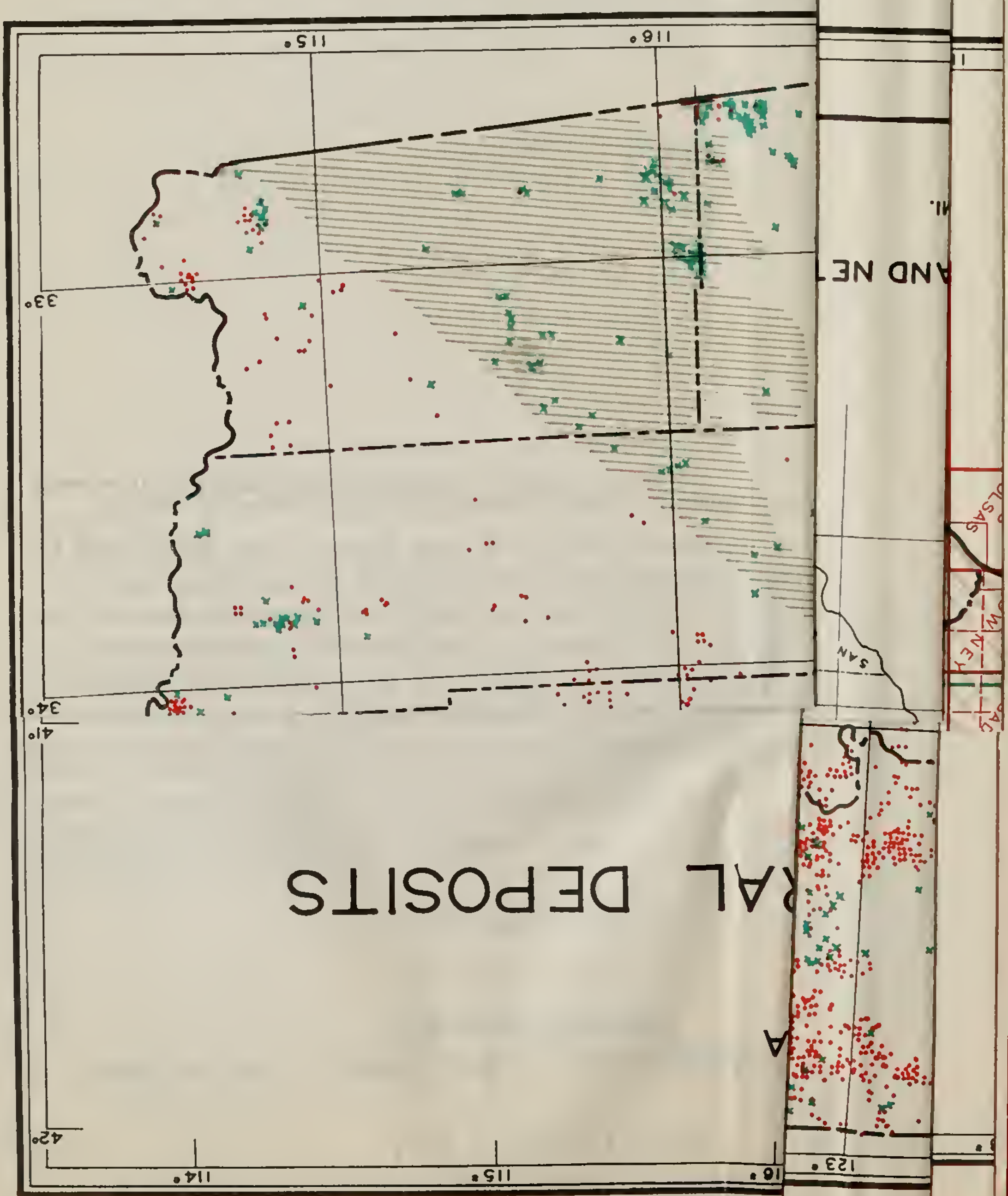

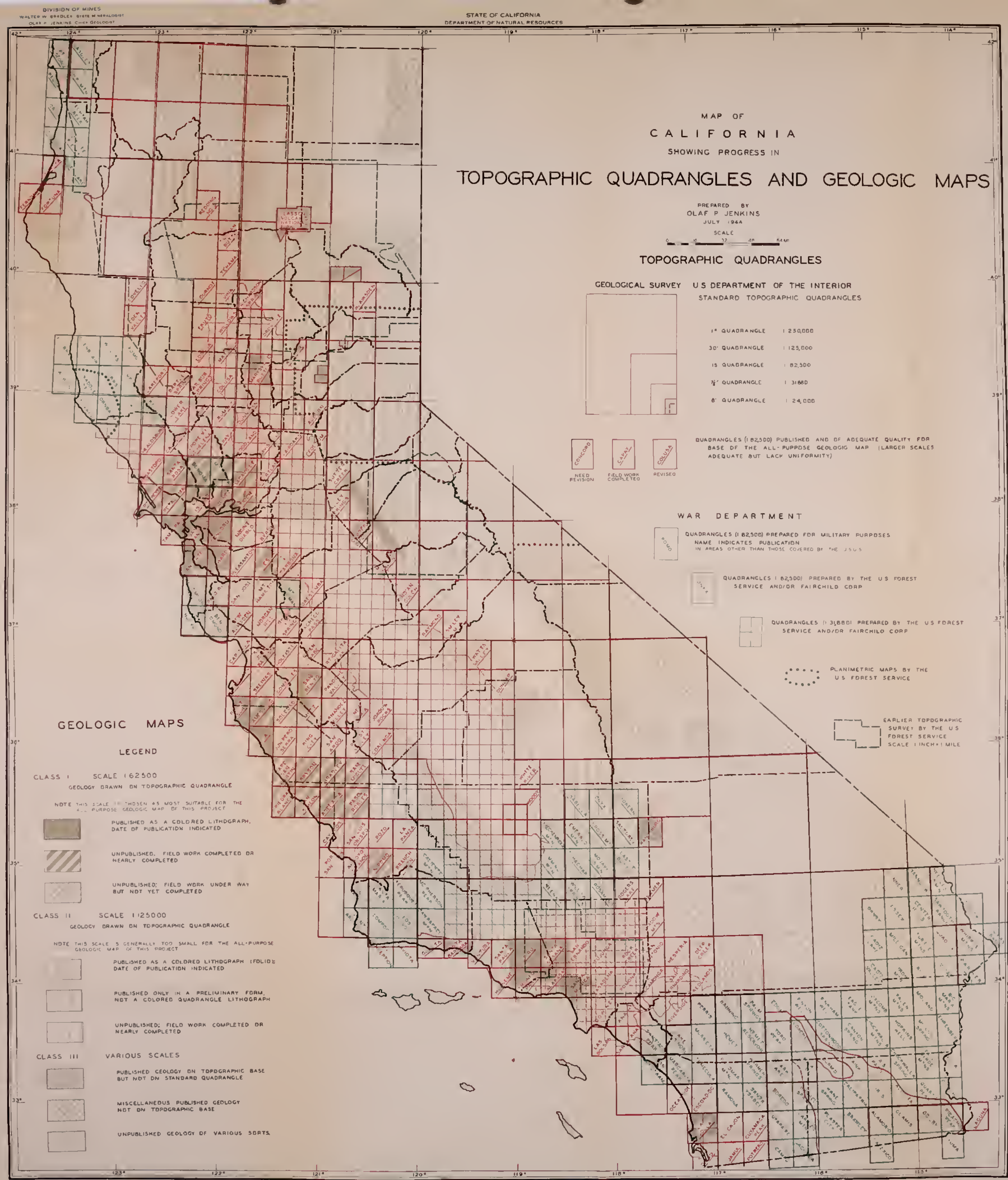

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MAP OF
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JULY 1944
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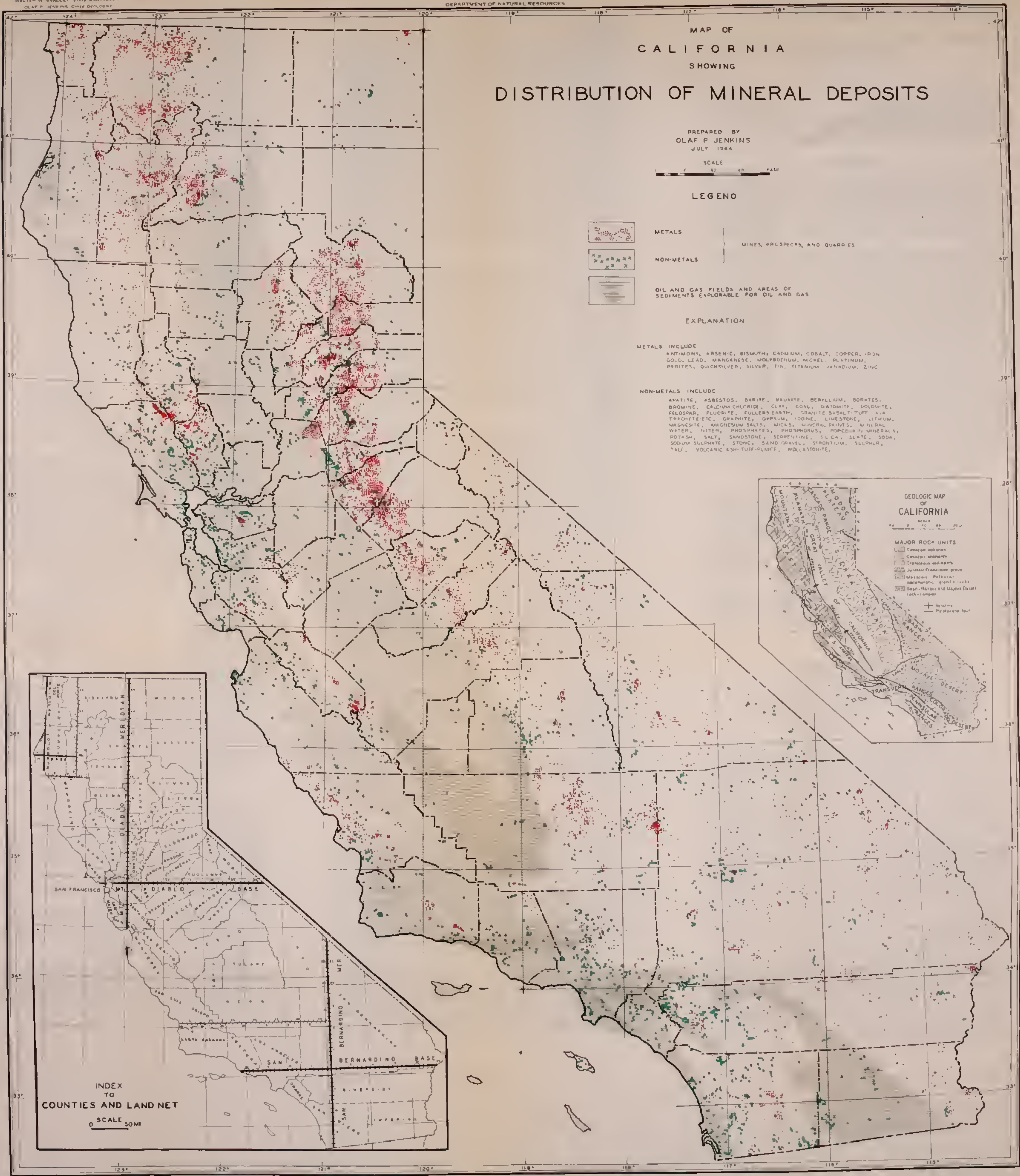

Reprinted from California Journal of Mines and Geology for April 1944, pp. 171-176

STATUS OF TOPOGRAPHIC AND GEOLOGIC MAPPING IN CALIFORNIA

By Olaf P. Jenkins *

OUTLINE OF REPORT

INTRODUCTION

The object of this report is to take stock of the topographic and geologic maps of California (as of July 1944); to show the relationship of these maps to the mineral provinces of the State; and to provide a basis for a plan of postwar mapping which would aid the mineral industry to expand and, in expanding, give employment to returned service men. Such mapping stimulates various enterprises; assists in the development of all manner of industries; and aids in the discovery of new mineral deposits.

Topographic maps of high quality, showing in detail every irregularity in surface form, express many geologic features which in turn help to show the position and structure of mineral deposits.

It is necessary, however, to formulate a program of mapping that is all-embracing and well coordinated, for topographic and geologic maps of high quality are needed in manifold industries and activities besides the mineral industry. Among these are: military operations; forestry; lumbering; geological and mineral examinations; mining development; oil and gas industry; agriculture; soil surveys; water resources and ground-water investigations; erosion control; development of parks, recreation, and natural resources of fish and game; land reclamation; road and bridge location; engineering construction; location of pipelines; tax assessments; insurance; education; archaeology, zoology, botany, seismology; studies of landslides and all surface forms.

Usefulness of maps depends also on their being completed as soon as possible and made generally available. Cost and efficiency are affected favorably by a broad program of work. The cost of mapping an isolated quadrangle would be extremely expensive as compared with the cost of mapping the same quadrangle in a group. The flying necessary to obtain aerial photographs would cost nearly as much for one quadrangle as for a group of quadrangles. An active, extensive, and speedy plan should be initiated at an early date, if full value is to be gained from the project.

PRESENT STATUS OF TOPOGRAPHIC MAPPING

The accompanying index map shows graphically and in colors the status of topographic mapping in California by quadrangles of the United States Geological Survey; also of the War Department and Forest Service. In this report, the scale of 1:62,500 (15-minute sheet) is considered both adequate and standard for an "all-purpose" topographic quadrangle. Larger scales (particularly 1:31,680, the 7½-minute sheet) are considered necessary for more rigid requirements; but smaller scales than 1:62,500 (such as 1:125,000) have become nearly obsolete for use in geological mapping or in other enterprises, scientific, engineering, or commercial.

The average area of the 15-minute quadrangle in California is about 238 square miles. It would take more than 700 such quadrangles to cover the State. About half of the State has been mapped on this and larger scales, though a third of this area is in need of revision. Most of the adequate maps have been made of the coastal region, but very few cover the more highly mineralized mountainous regions.

Scale of maps

State map	1:500,000	approximately 1" = 8 mi.
1° quadrangle	1:250,000	approximately 1" = 4 mi.
30' quadrangle	1:125,000	approximately 1" = 2 mi.
15' quadrangle	1:62,500	approximately 1" = 1 mi.
7½' quadrangle	1:31,680	approximately 1" = ½ mi.
6' quadrangle	1:24,000	approximately 1" = 2000 ft.
Aerial photographs	1:20,000	(A.A.A. and Forest Service)
Multiplex	1:10,000	(original scale of drawing before publication)

The Topographic Branch of the Geological Survey, Department of the Interior, is recognized as being the best qualified agency in the United States for making topographic maps of highest quality. Through many years of continuous and careful work the Survey has steadily improved the quality and accuracy of its maps.

The latest development in topographic mapping is the Multiplex method of accurately drawing contours and culture from a stereoscopic model projected from aerial photographs made especially for that work. The original drawing is usually made on the scale of 1:10,000, and is extraordinarily precise, showing in detail every feature which can be seen from the air. Though the final published work may be greatly reduced in scale, a photostat copy of the original drawing can be secured and used for special examination work, prior to the publication of the quadrangle. Revision of topographic maps can be made from time to time with very little work. The locations of mines, quarries, and all surface development operations are accurately and easily put on these maps. The final cost of these maps is no greater than that of the older planetable work. Mountainous and inaccessible areas are no problem to the Multiplex.

As might be expected, the earlier work of the Survey did not have the high standard of accuracy which is maintained today. Those maps surveyed prior to 1900 are now considered by the Geological Survey as inadequate for modern use. Some of the earlier maps were published on the scale of 1:250,000; these are only reconnaissance sheets. Up to a few years ago the scale of 1:125,000 was considered sufficiently accurate for use in mountainous regions. The scale of 1:62,500 is now considered to be most generally satisfactory for various purposes. The scale of 1:31,680, however, is rapidly becoming necessary especially in regions of low relief. Eventually this larger scale may be the general standard map scale for California, as is the case in many of the middle-western and eastern States.

Though all topographic work is now done with the use of aerial photographs, the method of their employment varies, and as a result the accuracy of the maps is not uniform. The use of the most modern equipment developed by the Survey (the Multiplex) has not yet been applied to mapping in California. Its employment would undoubtedly initiate a distinct improvement in maps of this State as it has done elsewhere.

In California, the Forest Service (United States Department of Agriculture) has mapped the topography of large areas of National Forests on the scale of ½" = 1 mile. These maps are now considered to be reconnaissance, and inadequate for the rigid requirements of modern investigations. More recently the Forest Service has prepared certain planimetric maps (one area in the northern Sierra Nevada; another about Point Arena) made from aerial photographs. After contours have been drawn upon these maps they will represent a topographic map of first quality. The Forest Service is preparing these to conform with the regular standard quadrangle. As a contribution to the war effort the topography of a number of quadrangles (one district in northwestern California and another in the southern Coast Ranges) have already been mapped by the Forest Service, using a device known as the "KEK Plotter," which has proved to be satisfactory in drawing contours from aerial photographs. All the work of the Forest Service is made available to the Geological Survey for the final publication of topographic quadrangles by the Survey.

As an emergency measure, the War Department has prepared and published (though not made generally available) in a comparatively short time a large number of topographic quadrangles, for the most part located in the coastal region. The objective has been military and therefore the results have not been the same as those obtained by the Geological Survey. For example, the maps do not contain the land net. The work has received the support of all governmental agencies including the Geological Survey and Forest Service. The maps are drawn, for the most part, on the scale of 1:62,500. Their accuracy and quality are not uniform, although they have all been made from aerial photographs. The results of the work are available to the Geological Survey, and any part may be incorporated in the final maps of the Survey.

Private agencies such as the Fairchild Aerial Surveys, Inc. have been employed by the Federal departments in the making of topographic maps, especially in the mechanical drawing of contours from aerial photographs. Maps by the Fairchild Corporation have proved to be satisfactory.

Aerial photographs, covering a large portion of the State, have been made by the Agriculture Adjustment Administration and Forest Service, both of the United States Department of Agriculture. Many of the important mineral lands are not covered by aerial photographs of any sort.

The Coast and Geodetic Survey (United States Department of Commerce) has published generalized topographic maps on the scale of 1:500,000 covering the entire area of the United States. These are called Sectional Aeronautical Charts, and California is covered by seven such sheets. Regional charts on the scale of 1:1,000,000 are also issued. Recently detailed planimetric maps (without contours) made from aerial photographs, scale 1:10,000, have been issued covering an area around San Francisco Bay, the delta area west of Stockton, and the coast line from Los Angeles to San Diego. The Coast and Geodetic Survey does not issue topographic quadrangles.

PRESENT STATUS OF GEOLOGIC MAPPING

There is no special agency which has been assigned only to the mapping of geology. There are many different kinds, shapes, and sizes of geologic maps in California prepared for various purposes and on various bases. Most of them are not published on a topographic base. Many excellent geologic maps of irregular areas were made for special use, but not as all-purpose maps that might serve various users. The distribution of these maps is shown on the accompanying index map.

*Principal geologic mapping agencies**

United States Geological Survey
- Geologic Branch
- Water-Supply Branch

California State Division of Mines
- Geologic Branch

Departments of Geology of Universities in California
- University of California
- University of California at Los Angeles
- Stanford University
- Pomona College
- California Institute of Technology
- University of Southern California

Departments of Geology of Universities outside of California
- University of Washington
- Yale University
- Harvard University

*Principal geologic map publishing agencies***

United States Geological Survey
California State Division of Mines
University of California Press
Geological Society of America

Detailed geologic mapping of a quadrangle requires careful examination, in the field, of every portion of the area. This generally involves years of study by a geologist trained in stratigraphy, paleontology, petrology, mineralogy, geologic structure, and topography. The boundaries between rock units are drawn in the field by plotting on the printed topographic quadrangle. The dip and strike of strata, foliation, or veins are generally indicated on the map. Structural lines, faults, and folds are determined and plotted. The field work is supplemented by laboratory and microscopic investigations of rocks, minerals, and fossils. Features of economic concern, such as the development of mineral deposits, are indicated on the map and described in the report; this is generally done after the mapping of the rock formations has been accomplished.

For many years the Geologic Branch of the United States Geological Survey carried on a regular program of mapping geology on quadrangles; the result was the well-known folio (now discontinued), which contained colored lithograph maps, including both topography and geology on the same map. The Survey has more recently concentrated its efforts on special examinations, with maps, generally of much smaller areas than quadrangles. The folio work, which in California covers only the northern Sierra Nevada and three small areas in the Coast Ranges, is still regarded as outstanding, and the most useful geologic work of any done in the State. It is now, however, out of date, in need of revision, and in need of re-mapping on a much larger and more accurate topographic base.

Mapping geology on topographic quadrangles has been carried on for a number of years by geological departments of universities, their faculty members and graduate students. The University of California has in recent years been especially active in this work, some of which has been published. The recently issued *Geologic Map of the San Benito Quadrangle* and the *Geologic Map of the Jamesburg Quadrangle* (in press), by the California State Division of Mines, are examples. These maps follow very closely the pattern of the early folio work, but are done in greater detail and on a larger-scale base. Plans for the publication of more such quadrangles are under way in the Division of Mines.

Some of the quadrangles that have been mapped geologically (by various persons associated with different universities), but not yet published, are:

Completed or nearly completed (scale 1:62,500)

Adelaida	Nipomo
Antioch	Paso Robles
Bradley	Piedras Blancas
Bryson	Point Reyes
Cape San Martin	San Miguel
Carquinez	San Simeon
Copperopolis	Vacaville
Mare Island	

Completed or nearly completed (scale 1:125,000)

Cholame	Priest Valley
Napa	

Under way (scale 1:62,500)

Blairsden	New Almaden
Branch Mountain	Reiff
Carbona	Salinas
Indian Gulch	San Juan Bautista
Lodoga	Soledad
Monterey	St. Helena (Pope Valley)
Morgan Hill	Tesla
Venado (Wilbur Springs)	Ventura

NATURAL PROVINCES AND MINERAL DISTRIBUTION OF CALIFORNIA

The distribution of mineral deposits in the State is shown graphically and in colors on a map accompanying this report. A three-fold classification has been made: (1) metals; (2) non-metals; (3) oil and gas fields, and areas of sediments explorable for oil and gas. The distribution of these three classes of minerals shows that they have a definite grouping or arrangement which conforms with the recognized natural provinces of California. Since the natural provinces represent an outgrowth of the geologic evolution of the State and are distinguished by peculiar geomorphic or physiographic features, it is not surprising that the distribution of the mineral deposits is controlled by these provinces. A still greater distinction between provinces would be brought out if the mineral deposits were further classified by kinds of minerals.

Natural provinces of California
(Physiographic or geomorphic provinces)

Coastal Region	Mountain Region
Coast Ranges	Sierra Nevada
Transverse Ranges	Klamath Mountains
Peninsular Ranges	Plateau Region
Great Valley	Cascade Range
Desert Region	Modoc Plateau
Mojave Desert	
Colorado Desert	
Basin Ranges	

The Coastal Region contains all of the oil fields, many strategic mineral deposits (quicksilver, chromite, manganese, and magnesite), and numerous non-metallic deposits and structural materials. The Desert Region contains mineral deposits of many sorts and an immense potential mineral wealth yet to be developed, including both metals and non-metallics. The Mountain Region contains the world-famous gold belt and many other mineral resources, and in addition hydro-electric power of enormous capacity which can be used for metallurgical development. The Plateau Region contains mineral deposits of lesser importance than those of the other provinces.

DEARTH OF MAPS IN THE MINERAL PROVINCES

In comparing the mineral distribution map with the index to topography and geology, it is clearly seen that preference has always been given to agricultural areas. In some places these areas have included oil and gas fields. The vast mineral provinces of the State, however, have been, for the most part, neglected. Maps of small scale, now out of date, are about the only ones available to the metal mining industry. This condition should be corrected, so that the mineralized areas would be supplied with adequate maps, both topographic and geologic, of sufficiently large scale to be of practical use. With adequate maps, great strides would undoubtedly be made in the expansion of the mineral industry.

The Multiplex method now employed for drawing contours on topographic maps from aerial photographs, makes it possible to prepare contour maps in great detail and on a large scale of the most mountainous and inaccessible regions. No longer is there any valid excuse for omitting the mountain areas from the mapping program.

Geologic mapping is dependent upon the availability of adequate topographic maps. If contour maps of high quality are made of the mountainous and more inaccessible areas, this will only be a challenge to the geologists, who would consider it a privilege to map the rock formations where they are best exposed. In such areas will come the discoveries of potential mineral wealth to build the future industries of the State.

* Chief Geologist, Geologic Branch of the California State Division of Mines.
Manuscript submitted for publication August 21, 1944.

* All these agencies have contributed geologic maps made on the topographic quadrangle base.

** All these agencies have published colored lithograph geologic maps of California printed on the topographic quadrangles as a base.

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STATE OF CALIFORNIA
DEPARTMENT OF NATURAL RESOURCES

DIVISION OF MINES

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